THE

VETERINARY JOURNAL

SEPTEMBER 1904.

Editorial.

POST-GRADUATE STUDIES.

SOME uncertainty appears to prevail in veterinary circles as to the scope and significance of the proposed post-graduate classes in Liverpool University. This is intelligible and quite natural, and therefore we make the following explanation:—

In the veterinary profession, as in all other walks of life, there are two distinct types of men. One is satisfied with possessing the irreducible minimum of knowledge, and is content to go on from day to day leading the same easy life which is so well described in their case as "jog-trot." These men think that the world will last their time; they do not see why they should try to be better than their fathers; they say they have no talent for discovery and investigation; they call in a specialist when a difficult case occurs; they eat well; they have a large and copious digestion; at night they sleep soundly—in very truth they are greatly to be envied. The other type of men feel, like Hamlet, that the time is out of joint—to what extent they are never quite sure, but they dare not disobey the divine command to be up and doing and endeavouring to put it right. This command is none the less inexorable because it is vague and instinctive rather than precise and definite. They may rail at what Hamlet calls the spitefulness of fate, but they must obey nevertheless. Now we must remember that Divine Providence, as St. Peter has pointed out to us, is no respecter of persons. That is, a man may assume the disguise of a sage or philosopher, a priest or king, and strut across the stage of life, and yet be a poor creature—a very poor creature—whom we ought to despise and not applaud. Conversely we may find the true benefactors of mankind in the humblest garbs, and our duty is to put these men in the highest places, but this is a duty which requires some courage for its fulfilment, and we generally try to evade it. The Liverpool scheme is an attempt at recognition of this very apparent duty; its aim is to give the striving and energetic veterinarian an opportunity of continuing his scientific studies at his leisure without impeding him in any way with pedantic restrictions. And here we may take up for a moment the question—which we have so often and so laboriously discussed—of Preliminary Examinations. It is quite true that the

Royal College of Veterinary Surgeons demands a less severe test than the Medical Council imposes. But does this imply any necessary inferiority in the class of student? We think not. It is a well-known fact that Medical candidates at our Universities take an easier examination than Arts students, but nobody would think of asserting that our Medical students are as a body inferior to the Arts men. The contrary opinion might be more easily maintained. No, the truth is that University authorities have come to see the futility and the injustice of expecting the same *literary* skill in men intended for a purely scientific career that we expect in those destined for a purely literary career. So it is with Veterinary students; the same principle is at work, though in a different degree, and no one thinks less highly of them. The time may come—probably will soon come—when these distinctions shall disappear, but we need not fret in the meantime.

In the same way it is probable that changes will take place in the Veterinary Curriculum at our Colleges, and that men with the scientific tendency will obtain opportunities whilst students of satisfying to the full their ardent desire for knowledge. It may be that then we shall have two or even three distinct classes: men who wish merely a general veterinary training, which will enable them to make a living as plain veterinary surgeons; others who wish to have a sound scientific in addition to a professional training at a University; and a third class who aim at all these things, and aspire to a University degree in addition. In preparation for this eventuality, and by way of smoothing, as we have said, the path of the men who are at present in the profession, either as students or practitioners, both Liverpool University and Manchester University have arranged for post-graduate classes. These will fill up the gaps which at present exist, but even if they should prove to be only stop-gaps, they will have fulfilled a useful purpose. Everywhere one finds veterinary surgeons who regret the thoughtlessness of youth, and who wish they had attended more carefully to their book-work or the professor's lectures, or had availed themselves more fully of the opportunities of clinical study which were offered to them at college. Youth with its natural vivacity finds all study a weariness of the flesh; it looks with a somewhat scornful eye on those of its class who give their days and nights to studious employments, and it calls them "stews" and "swots" and "blokes," and uses other opprobrious epithets, but in after years it secretly envies the success of those whom it once despised. Well, in many cases these thoughtless lads develop into men of great ability; they become acute observers, but they lack that which will enable them to classify and co-ordinate their observations, or they become swift and skilful operators, but are always haunted by a dread that for lack of a more substantial scientific basis their skill may prove to be mere good luck which will one day evaporate. It is hoped that post-graduate classes will help such men out of their

difficulties; everything will at least be done to encourage study and investigation of physiological and pathological phenomena by men who have already begun the battle of life and are in the midst of its turmoil; every effort will be made to encourage thereafter our members to raise the status of the profession, and gain the respect and approval of other professional bodies.

When the present writer proposed in 1898 that an additional Degree should be conferred by the Royal College of Veterinary Surgeons, he did so in the belief that the Universities of the country would take no direct interest in veterinary matters. But his scheme embraced certain subjects which at the time were not as fully taught in the colleges as they might have been. This, then, was merely part of a larger scheme; it was believed that candidates would in all probability take University classes, and that thus a University connection would gradually be obtained. Such scheming is no longer needed. There is now a Faculty of Veterinary Medicine and Surgery in one of our Universities, and the profession has now obtained University recognition—a recognition which many members of the profession have in their innermost hearts desired for many a long day.

In the natural course of events the veterinary candidate will a few years hence be asked to pass a stiff preliminary examination; he will attend classes at our Universities and at such Colleges as may survive; he will obtain a University degree, and thereafter a licence to practise from the Royal College of Veterinary Surgeons if he can satisfy their tests. So equipped, he will be able to defy the world.

National Veterinary Association.

ANNUAL CONFERENCE.

On the 16th August the members of the National Veterinary Association opened their Annual Conference in the Lecture Theatre of the Royal Dublin Society, where they were received by Mr. C. Uniacke Townshend, Vice-President, who welcomed them on the part of the Royal Dublin Society. The profession, he said, was one in which the Society had always taken a deep interest, and it was due to the efforts of the Society in the first instance that a Veterinary College had been established in Ireland.—(Applause.)

The President (Mr. Charles Allen) welcomed the members of the Association to Dublin, and thanked them for having elected him to be their President. Four years had elapsed since the Association had previously met in Ireland, and he hoped that in the future Ireland would, with England and Scotland, welcome the members in turn.—(Applause.) Since they had last met in Dublin many events of interest to them as a scientific body had occurred. At the London Congress Professor Koch had startled the world by declaring, in almost as many words, that tuberculosis of the lower animals was not the same as tuberculosis in man, and that the one

could not be transmitted to the other. The assertion came as a great surprise, as it was apparently counter to all experience, and in opposition to the facts revealed by experiments and teaching. A Commission was appointed to investigate the question raised by Koch, of which a very distinguished ex-President of their Association was a member.—(Applause.) So far as the Interim Report of the Commission published showed, the statement of Professor Koch had not been borne out, and save by adhering to his assertion Koch had proved nothing. The members of the Veterinary profession were aware of the loss of valued colleagues from tuberculosis with which they were accidentally inoculated when making post-mortem examinations. One positive case was of more value than 10,000 negative cases, for the whole question of the transfer of a disease from an animal of one species to an animal of another species was not only dependent upon the degree of the virulence of the virus, but also upon the susceptibility of the other animal to infection.—(Hear, hear.) Since they last met in Dublin a Commission had inquired into the cause and prevention of cancer. The work already done by the Commission was suggestive, and had opened up fields of research for those who devoted their lives to laboratory work. Members of the profession could render great assistance if they forwarded specimens for examination.—(Hear, hear.) After referring to some technical questions, the Chairman mentioned that four years ago the Royal Veterinary College of Ireland merely existed on paper, and it was now a credit to the profession, and when completed they would have a College creditable to the Veterinary profession in Ireland. (Applause.) The Veterinary surgeon ought to be—as medical men, dentists, and chemists were—exempt from serving on juries.—(Hear, hear.) In conclusion, he expressed the hope that the discussion of the papers to be submitted to the Association would be of real benefit to all.—(Applause.)

Captain Martin read a paper on "Epizootic Lymphangitis." This is a disease, he explained, which is causing a great deal of injury in the United Kingdom, and which is regarded as an exotic disease imported from South Africa.

Professor Mettam in a technical speech dealt at some length with the paper, and displayed a number of photographs, which were thrown on the screen.

Col. Blenkinsop, P.V.O.; Professor Owen Williams; Messrs. A. W. Mason, Leeds; J. Cameron, Berwick-on-Tweed; C. Roberts, Tunbridge Wells; W. Hunting, London; and James M'Kenny, Dublin, took part in the discussion on the paper.

Professor Woodbridge read a paper on "Hæmoglobinuria in Bovines."

Mr. Cargil Patrick and a number of the members joined in the discussion, which was technical.

THE DINNER.

In the evening the Dinner was held in the Dolphin Restaurant, at which Mr. Allen presided.

After the usual loyal toasts had been proposed and responded to,

Professor Carroll expressed his appreciation of the work which the Royal Dublin Society had done.

Sir Charles Cameron, in a humorous speech, congratulated Dublin on having made the best possible provision against all possible attacks from all possible contagion.—(Applause.)

XUM

Sir Chistopher Nixon, in proposing the toast of the Royal College of Veterinary Surgeons, said that he had not alone to thank the members of the Association for extending to him their hospitality, but also for the honour of being asked to propose the important toast entrusted to his care. The compliment was appreciated all the more from the fact of his being a member of a sister profession, with which, especially at the present time, veterinary medicine is most closely allied. This, he feared, was not recognised as fully as it should be, nor were the opportunities afforded by the scientific methods of investigation employed in dealing with diseases of animals, and especially in the methods of prevention, utilised as fully as they should be. To some extent in Ireland this might be attributed to the want for a long time of a centre for Veterinary teaching. But the establishment of a Veterinary College in Ireland would in many way effect all that was desirable. It would give a strong impetus to teaching; it would provide facilities for the highest order of scientific investigation of diseases of animals, and especially of those which are communicable to man, and it would deal exhaustively with those problems which in an agricultural country are so intimately bound up with its material prosperity. When they bore in mind that from two exotic bovine diseases—pleuro-pneumonia and foot-and-mouth disease—the loss sustained in the United Kingdom amounted to nearly £86,000,000, that cattle plague cost the country some six or eight millions, and that the yearly loss from preventible diseases in animals in India amounts to some six millions—he ventured to say, regarding the question merely from an economic standpoint, however high a value might be put upon the services rendered to the public and the State by the exercise of human medicine, these services could not compare with the influence exercised upon the material prosperity of the country by Veterinary science properly and efficiently directed. It was especially in this direction that he looked forward with, he would say, anxious expectancy to the future work of the College of which he had the distinguished honour of being President. He thought he was justified in saying, judging from the success—the phenomenal success—not merely in the number of its students, but from the character of the scientific work done in the College, that it was bound to leave its mark upon the progress of the country. It was in this connection that the toast of the Royal College of Veterinary Surgeons had a special claim on their most cordial support. Unlike the medical profession, there was but one portal through which all Veterinary students must pass. In his own profession there were over twenty different avenues, by any one of which the candidate might reach the goal. The evils of such a system one could see tended to retrogression rather than towards progress. When, sixty years ago, the Royal College of Veterinary Surgeons obtained its charter of incorporation it became the sole licensing body in the United Kingdom, its powers extended to the framing of the curriculum, to the extension of the period of study to four years, while it had the important duty imposed on it of keeping the register pure, thus exercising in many respects the duties and obligations imposed by statute upon the General Medical Council. The Royal College has had given it the absolute control of a great profession, leaving it, without interference, the right to make all the laws, rules, and ordinances which appertain to it. He believed he was correct in saying that it had justified the confidence placed in it. It had certainly raised enormously the status and tone of the profession, and by the judicious

exercise of its penal powers it had exercised a healthful influence upon the entire body of its members. Its action had been always prompted by an enlightened spirit, and this was specially shown by the facilities which it gave for the establishment of a Veterinary College in Ireland at a time when considerable opposition to the movement was encountered. The Royal College insisted at the time, and rightly insisted, that the Irish College should not seek for powers to grant licences, and to this the Governors of the College were definitely committed, and he hoped no attempt would ever be made to disturb the present mode of granting the licence to practise, a mode so beneficial to the profession at large. Whilst, however, conceding this, he ventured to urge that the Royal College, by every means in its power, should encourage its licentiates to obtain University degrees in Veterinary science. The Universities appeared to be awakening to the importance of recognising Veterinary Medicine as a branch of University studies. Some of the older as well as the modern Universities were taking steps in this direction; and it would be highly desirable that the College of Veterinary Surgeons should see that the University recognition of the profession was not of a halting kind, but such as was accorded to the other learned professions. The Council of the College would, he felt sure, be prepared to recommend that the standard both as regards curriculum and examination should be raised to the very highest level, and they had then the right of demanding that Veterinary Medicine should be placed in no invidious position. It was a matter of the greatest importance to develop a class of men who would be prepared to devote their lives to teaching and research. Such men should be thoroughly competent to teach the various subjects of Veterinary training, such as anatomy, physiology, pathology, &c. He would go further, and say that even in chemistry and biology the teachers should deal with these subjects from the Veterinarian standpoint, hence the necessity of securing men thoroughly competent, and who would enforce consideration and respect by their academic standing. He thought he had detained the members of the Association at sufficient length, but not longer than the importance of the toast of the Royal College of Veterinary Surgeons deserved, so that he hoped they would drink it with all the honours.—(Applause.)

The other toasts were duly honoured.

(*Irish Times, August 17th.*)

Original Papers.

SECOND ANNUAL REPORT OF THE IMPERIAL CANCER RESEARCH FUND.

THE point of special interest in this report to members of the veterinary profession is the fact that by their aid it has been made known that *cancer* is not a special disease of mankind, but is found to affect all classes of vertebrates, and with this knowledge it behoves us to do all we possibly can to assist those who are making a special study of this disease, which as affecting man and animals comes second to tuberculosis. Were these two scourges eliminated from the diseases common to man and animals, we should have advanced a long stride towards the millenium.

In the report of Dr. Bashford, the General Superintendent, it is stated:—

"I. Experimental Work on the Nature and Processes of Growth of Cancer.

"With the official collaboration of the Board of Agriculture and the voluntary assistance of the Veterinary Profession, an extensive series of tumours from various domesticated animals has been examined. Through the generous collaboration of numerous private persons at home and abroad, specimens of malignant new growths have also been obtained from many lower vertebrates, including 14 cases of carcinoma in fish. Two additional cases of malignant new growths in fish possess a special value because they were derived from marine fish living in a state of nature; a similar interest attaches to a spheroidal-celled carcinoma discovered in a wild mouse. These are the first fully authenticated cases of cancer in wild animals.

"The labour involved in the microscopic examination of this extensive series of specimens will be appreciated when it is stated that upwards of 2000 specimens have been examined, which involves the cutting and mounting of many series of sections of each specimen. Reports on the nature of the tumours have generally been made, and in many cases microscopical preparations have been forwarded to the senders. The details of the specimens examined are as follows:—human 266; horse 116: cow 99; dog 247; cat 43; pig 8; frog 6; bird 13; mouse 850; fish 80; rat 28; rabbit 32; sheep 8; goat 7; bull 1; miscellaneous 329.

"The histological examination of the above-mentioned specimens has been wherever possible combined with their biological study as regards the possibility of transplantation, and the phenomena of growth. This combination of histological, biological, and experimental study has proved of great value in elucidating the fundamental features of cancer, and has been shown to possess great advantages over the methods applicable to the study of cancer in man. The general results of the work carried out on the above lines may be summarised briefly.

"Cancer has been discovered to pervade the whole vertebrate kingdom. It presents constant fundamental characters. The great diversity of the food, habitat, and conditions of life generally of the animals in which cancer occurs shows that such external agencies have no causative influence. The histological characters, methods of growth, and the absence of specific symptomatology, irresistibly lead to the conclusion that it is not permissible to seek for the causative factors of cancer outside the life-processes of the cells."

[I. *We cannot agree with this speculation. In fact, so far as it goes, the evidence seems to lead to the opposite and more hopeful conclusion that environment does play a part in the causation of cancer.*]

"The results of the investigation into the extent of the distribution of cancer in the vertebrates were laid before the Executive Committee on October 8th, 1903. Steps were immediately after taken to extend the search for cancer to the invertebrate kingdom. Mr. A. E. Shipley, F.R.S., Cambridge, kindly communicated with all the leading zoologists in this country and in the colonies with the object of attracting their attention to the matter.

"It has been possible to elicit proofs in support of the conclusion that the causative factors of cancer must be sought in the life-processes of the cell by the experimental study of transplanted tumours. The transplanted tumours arise from the tumour cells introduced, by cell-division, and present in all stages of their growth and in all generations the same uniform minute structural characters. Growth can only take place in the body of animals of the same species, and fails in even nearly related animals. Any agency which merely destroys the vitality of the cells renders the results of transplantation completely negative. The power of independent growth after transplantation is confined to the cells which are the characteristic feature of the tumours as distinct from the supporting and nutritive structures, or stroma, and it is significant that the minute features undergo no change; the cells of the transplanted tumour are identical in form and structure with those of the tumour from which it was taken."

[II. *Dr. Bashford seems here to ignore or to be ignorant of the recorded experiments of successful inoculation from man to white rats.*]

"Certain cells of malignant new growths of man and animals have been found to present nuclear changes similar to those by which the sexual cells are prepared for fertilisation, and the fusion of nuclei in a manner which is equivalent to a fertilisation process known as conjugation has been repeatedly demonstrated in transplanted tumours of the mouse, and has acquired increased significance from the discovery of the like phenomenon in a primary tumour from the human subject. The discovery of conjugation between the nuclei of cancer cells is one of far-reaching importance. The processes which are antecedent to it acquire their significance only by the consummation of this process of fertilisation.

"Certain well-known characters stamp malignant new growths as independent organisms; and it may be pointed out that should further investigations support the observations already made, the general establishment of cell conjugation in malignant new growths may afford an harmonious explanation of all their features, and at the same time yield a rational explanation of the initiation of the cancer cycle. The superaddition of malignant growth to the processes of repair and inflammation, and to benign and congenital tumours, presents no difficulty under this assumption; indeed, their apparently conflicting claims are thereby brought into harmony also.

"It may be that the discovery of cell conjugation in transplanted tumours indicates the problem which has to be faced in endeavouring to control their growth. The elaboration of the experimental method along suitable lines may point out a definite direction along which the search for rational therapeutics should proceed.

"The preceding investigations have already been more fully recorded in papers published with the authority of the Executive Committee and in the first scientific report. They have been conducted conjointly with Dr. Murray, to whom also the thanks of the Executive Committee are due for the painstaking and accurate illustrations included in the first scientific report. Acknowledgment must also be given to Mr. Hall for the care with which he has attended to the welfare and records of the very numerous experimental animals, and to Mr. Miller for his diligent preparation and sectioning of the large number of specimens.

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"II. EXPERIMENTAL INVESTIGATIONS BEARING UPON THE DIAGNOSIS AND TREATMENT OF CANCER.

"An essential preliminary to the problems involved in attempting to modify the growth of cancerous tissue must be the possibility of producing at will by transplantation the disease in animals, in order to provide an adequate supply of tumours. The fulfilment of this primary condition is essential for the search for facts which will give specific evidence of the presence of a malignant growth and be of diagnostic value.

"This has been accomplished in certain experiments which have been made, and is being further tried in experiments in progress.

"By means of the experimental observations thus rendered possible various procedures which may legitimately be conceived to modify the powers of growth of transplanted tumours, or to yield specific evidence of their presence, have been studied. Thus a serum has been obtained capable of acting upon the tumour cells in the test-tube. Attempts, however, to produce the same effects in actively growing tumours in living animals have yielded negative results. The explanation of this discrepancy between the test-tube experiments and those in the living body has necessitated extensive control investigations and inquiries in fresh directions; these have been placed upon a more extensive basis since the appointment of Dr. Cramer. The generous co-operation of Dr. C. J. Martin, Director of the Lister Institute, has enabled the Cancer Research Fund to have artificially propagated mouse tumour disintegrated in a form suitable for the production in sufficient quantity of a highly potent serum. These experiments on the mouse must be regarded as only of a preliminary nature. They have not yet yielded any results of practical therapeutic value, although their theoretical importance should not be underestimated. They will also serve as a basis for formulating more extensive therapeutical investigations so soon as tumours can be transplanted in larger animals.

"The artificial transplantation of malignant tumours has been utilised to seek for specific evidence of their presence in an otherwise normal animal. The only apparent consequence of successful transplantation is the development of a lump at the site of inoculation, unaccompanied by any constitutional disturbance of a specific nature. Subsequent microscopical examination is necessary to determine the nature of the lump. In the number of animals which have been studied while suffering from primary new growths, no specific symptom of the presence of the latter has been observed, and the conclusion of necessity is drawn that Cancer *quâ* Cancer in man and animls is still without a specific symptomatology. This conclusion loses its apparent surprising features when the results of the examination of transplanted tumours and of primary tumours as regards their microscopical characters are borne in mind. As already stated, the cells introduced by transplantation themselves grow and produce the new tumours, and the latter present characters identical with those of the tissue in which the primary tumour arose, and never cell-masses of heterogeneous type.

"Artificially transplanted tumours afford the most favourable circumstances for testing the claims made on behalf of various reputed empirical therapeutic methods. Of these the number brought to the notice of the Cancer Research Fund is very great. It has been necessary to examine in detail the action of radium bromide. Tumours of the mouse transplanted

subcutaneously have been subjected to the action of radium bromide, and in some cases the rate of growth has been diminished, in other cases has ceased altogether, and the tumour has practically disappeared. In other cases, again, no action has yet been observed. It has been necessary to determine in how far the susceptibilities to radium rays of the tumours and other tissues vary, and for this purpose control experiments are being carried out. They are not yet concluded, but there is no doubt that the action of radium is not limited to cells of the malignant tumours. Subcutaneous transplanted tumours of small size are peculiarly accessible to and favourable for the manifestation of the action of radium, but afford no ground for predicting the curative effect of radium upon deep-seated primary tumours."

[III. *We are glad to see that the experiments of the Imperial Cancer Research Fund regarding the action of radium confirm the promising results already published from Ehrlech's laboratory for destroying superficial tumours.*]

We would beg of all members of the Veterinary Profession to do all they can to aid this great investigation by sending all malignant growths either to the Imperial Cancer Research Fund Superintendent or to the Cancer Research Laboratory in the University of Liverpool. Both Laboratories are doing excellent work—there is no rivalry. Dr. Bashford, in London, and Dr. Grünbaum, in Liverpool, are both working for one end, and that they endeavour to find a cure or a preventative for one of our greatest scourges—Cancer.

AFRICAN COAST FEVER.

(Extract from Fourth Report).

For a detailed account of the field experiments conducted in connection with the African Coast Fever investigations our readers are referred to the full text of the report. The following extract contains what is possibly Dr. Koch's last word on the subject of a disaster that will always stand out as a landmark in the history of the country.

After considering in detail the results obtained from the practical application of the method of protective inoculation recommended in his last report, Dr. Koch states:—

"Our work shows that the establishment of artificial immunity is a much more gradual process than I at first hoped it would be.

"With regard to the suitability of animals for inoculating from, we find comparatively little difference in the effect produced by the blood of various animals with which we carried out our inoculation, but more marked benefit appeared to be derived by the use of blood drawn from animals which had recovered from a real attack. Our experiments also show that five cubic centimeters of defibrinated blood is a sufficient quantity for each injection, and a regular system of fortnightly injections I find is best. By the preliminary weekly injections recommended in my former report, I hoped to hasten the establishment of immunity, but I am now convinced that it is impossible to force the process.

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"I feel certain that in the course of the next few months, proofs of increased immunity in inoculated herds will be forthcoming, therefore I strongly recommend the continuance of the field experiments already begun, modifying the original process by using five centimeters of recovered blood instead of ten, and allowing an interval of a fortnight between each injection.

"It is a matter for regret that immunity is established so slowly, but the method recommended is satisfactory in this respect: that once animals are thoroughly immuned no further treatment will be necessary, for they will be permanently immune, and their progeny, after contracting the disease in a mild form, will also resist further infection.

While I have called attention in previous reports to the fact that this disease has only been found in Rhodesia, in the Transvaal, and on the African Coast, it is of great interest to note that Dschunkowsky, in No. 4 of the *Centralblatt fur Bakteriologie*, lately published, describes a disease prevalent in the Russian Trans-caccasus which is very probably identical with African Coast Fever, judging from the train of symptoms described as occurring in infected animals and from the drawings given of the specific parasite. I think it is not improbable that a more extended search will show that the disease is more widely distributed than we at first supposed.

"CONCLUSIONS.

"I will close these reports on African Coast Fever by stating briefly the conclusions which may be drawn from a consideration of our experiments and observations so far as these are of interest in enabling us to understand the nature of the disease, and so far as they suggest what steps should be taken to combat its spread.

"1st. African coast fever is a cattle disease caused by a characteristic blood parasite, and cases of the disease can be readily identified by a demonstration of the specific organism.

"2nd. It is different from Texas fever or so-called redwater, which was introduced into and spread widely over South Africa before the advent of African coast fever.

"3rd. African coast fever may be combined with redwater, and hæmoglobinuria (blood-coloured urine) is only observed in such cases. It was the occurrence of cases of mixed infection of this class which rendered the identification of the disease so difficult when it first came into the country.

"4th. The disease did not originate in Rhodesia, but was introduced from the coast.

"5th. It is not transferable directly, and sick animals can be stabled with healthy ones without communicating the disease.

"6th. The disease can only be spread by ticks. In this respect it resembles Texas fever.

"7th. The mortality from African coast fever is very high, the loss in an infected herd commonly amounting to 90 per cent.

"8th. Animals which survive are protected against second attacks, and so long as they remain on infected veldt their immunity continues. That this is the case, and that the progeny of such animals are protected to a certain degree and become immunised by mild attacks of the disease during infancy, a consideration of the coast fever areas on the East Coast of Africa proves.

"9th. In the manner referred to in paragraph 8, a really immune stock will be evolved in any country in which the disease appears.

"10th. Immune animals are not free from parasites. There are always a small number of ring-shaped or ovoid parasites in the blood of such animals.

"11th. By the transfer of parasites from salted to healthy animals by ticks, the disease can be produced in a virulent form. This fact explains the mysterious infection of healthy stock by recovered and apparently healthy animals if herded together on the same veldt. The introduction of susceptible animals into a pasture over which salted animals have grazed and dropped ticks, may suffice to infect them, although they never come into actual contact with the immune herd.

"12th. It is impossible to produce the disease by single injections of blood drawn from a sick animal and containing the parasites, although this can be readily done in Texas fever.

"13th. Repeated injections into healthy animals of blood containing parasites, at intervals of fourteen days, produce a very mild infection characterised by a slight rise of temperature and the appearance of a few parasites in the blood. By such mild attacks animals so treated become immune after four or five months.

"14th. For immunising purposes the blood of a recovered animal can be used if the parasites are present, but care should be taken to see that such blood is free from the parasites of other South African diseases, such as trypanosoma and spirilli.

"15th. Inoculation *per se* can do no harm if ordinary care is taken to conduct the operation in a cleanly manner.

"16th. A clean herd can be protected by careful isolation from suspects, particularly from such animals as have had the disease and recovered from it. For this purpose fencing is beneficial.

"17th. The destruction of ticks by spraying or dipping is advantageous and helps to check the spread of the disease, particularly when combined with fencing. The discovery of a certain and safe method of destroying all ticks which so far we have not at our command, would arrest any further spread of the disease.

"18th. After the disease has appeared in a herd, movement of such a herd to clean veldt from time to time, particularly after outbreaks, is beneficial, and will sometimes suffice to free it from infection if the conditions are favourable.

"19th. Clean veldt is only such veldt upon which neither sick nor recovered animals have grazed for at least twelve months.

"20th. Such expedients as fencing, dipping, spraying, and moving animals, have only a temporary value, as sooner or later the disease will extend to and involve all herds in the vicinity of an infected centre, as Texas fever did, therefore such precautions should be supplemented by inoculation with recovered blood whenever disease appears in the vicinity.

"21st. The artificial establishment of immunity takes from four to five months. It is devoid of risk, inexpensive, and when animals are fully immunised no further treatment is necessary. Until this stage is reached, animals should be protected as far as possible by spraying, fencing, and periodical movement. (Signed) "R. Koch.

"Bulawayo, 1904."

HORSE SICKNESS.

Progress Report.

It is a fact well known to South African stockowners that horses which have recovered from horse-sickness are unlikely to sicken again from that disease, or if they do they generally contract it in a mild form. Such recovered animals are said to be "salted," a popular term indicating the acquirement of immunity under natural conditions. The knowledge of this fact, that salted animals are highly resistant to further infection, has led investigators for many years past to attempt to protect susceptible animals by producing attacks of horse-sickness by artificial means, in the hope that such artificial attacks would be less frequently fatal or more amenable to treatment than those occurring in animals naturally infected. Some experiments have succeeded, but so far the number of animals immunised in this manner has been small, and the attendant mortality has been so large that such methods have hitherto been regarded as impracticable, being too expensive and uncertain.

Many recorded experiments have been conducted on lines suggested by consideration of the good results obtained by the employment of serum in the treatment of rinderpest, and in some cases a serum for horse-sickness was obtained by the fortification of immune animals which possessed certain protective powers, but unfortunately the severe and frequently fatal hæmoglobinuria following its use, due to its hæmolytic properties, debarred investigators from carrying on further experiments in this direction.

Science, however, is continually advancing. New methods of artificial immunisation are being discovered, and old ones improved upon, and on this account I considered it advisable to attempt to improve the serum method of immunising against horse-sickness, as this line of work seemed to be more promising than any other, and because I hoped that new methods might give better results. For this purpose several salted horses were obtained, whose immunity I intended to heighten artificially, material for fortification being obtained in the first case from a horse suffering from horse-sickness, which Colonel Bodle kindly sent to Hillside Camp. This animal died on the road, the post-mortem revealing all the ordinary characteristics of horse-sickness. Blood taken from it was injected into several salted horses and one unsalted animal. The latter subsequently developed the disease and died, its blood being used to fortify the salted animals, which remained perfectly healthy, and were therefore judged to be immune and suitable for fortification. Subsequently these animals received big doses of virulent horse-sickness blood, subcutaneously and intravenously, at intervals of three and four weeks. The maximum dose injected was 2000 c.c., which was sustained without any ill effect. After a certain number of injections, one fortified horse was bled and its serum tested, to determine whether it possessed any protective properties. Experiment proved that it did have such properties, but only to a very slight degree. In artificially infected animals injections of this serum merely delayed the incubative period and prolonged the duration of the disease: I therefore continued the fortifying process for some months before again testing the serum. At the second test it was found to be highly protective, and to ascertain its strength five horses were injected subcutaneously with various doses of serum, receiving the following day a uniform dose of viru-

lent blood which had been previously tested, and which had invariably proved fatal to susceptible animals. One of the five horses inoculated, a young Australian animal four years old, developed the disease, recovered from it, and afterwards received successive injections of virulent blood without any harm resulting.

The other four inoculated animals remained perfectly healthy, and in order to determine whether this was due to natural immunity or to the protective power of the serum, sixteen days were allowed to elapse, and then three of them (two old animals and a young one) were again inoculated with the virulent blood only, the dose being the same as that given in the first instance.

All three inoculated animals developed horse sickness and died after the incubation period.

This experiment proves, first, that horses used were susceptible; second, that the serum enabled them to resist inoculation with a lethal dose of virulent blood; and third, that the protective properties of the serum only protected those animals which did not react for a period of fifteen days.

I also endeavoured to ascertain whether the serum had any value as a curative agent after the development of the disease, but I regret to state that it has not, as several infected horses, treated at the onset of the disease, when the temperature began to rise, with repeated large doses of serum, given both intravenously and subcutaneously, in some cases to the amount of 1000 c.c., failed to rally, and died of horse sickness, although a fall of temperature, and the subsequent prolonged course of the disease, indicated that the serum did possess some slight therapeutic power.

From this it would appear that horse sickness serum in its action resembles tetanus and plague serum, both of which have highly protective and only slight curative powers.

Fortunately, I found that this serum possesses no hæmolytic properties, and does not cause hæmoglobinuria, therefore we are in a position to attempt to immunise animals on similar lines to those which are followed in actively immunising cattle against rinderpest. What has to be done is to find out what combination of serum and horse sickness virus will produce a mild attack of the disease sufficient to protect the animal, but not severe enough to be dangerous. For this purpose we have to ascertain what doses of virus are most suitable, whether it is best to use large doses of virus, or merely lethal doses, what dose of serum can be depended upon to control the action of such virus, whether it is more satisfactory to inject serum and virus simultaneously or with an interval of several days between the injections of each, whether the virus should be given before or after the serum, what is the most suitable site for inoculating, and whether subcutaneous or intravenous inoculations are best. From this it will be seen that there are many important questions still to settle, and answers to these can only be given after experiments have been made.

With a large number of experimental animals, these problems could be solved in a comparatively short time, but the number at our command was small; we could only use single animals for each experiment, and several times work was delayed and experiments had to be repeated, as a suspicion always existed that some of the old animals with which we were working might be naturally immune. Under such conditions work progressed slowly, but, nevertheless, very interesting and practical results are forthcoming.

I have been able to demonstrate that it is possible by combinations of virus and serum to produce in susceptible animals a mild attack of horse sickness from which they recover, and after which they are immune, and I find that an attack of horse sickness, characterised by no external evidence of indisposition, but merely by a rise of temperature lasting several days, is sufficient to give protection. Up to the present we have artificially immunised three horses and two mules by this method, and these animals subsequently resisted inoculation with lethal doses of virulent blood. Of course they have still to be exposed to natural infection, but our experience in rinderpest and other diseases shows that animals immunised in this manner successfully resist such exposure. Further, it has been found that a dose of serum injected four days after the animal has been inoculated with virulent blood will arrest the development of the disease, and from this line of treatment in particular I expect good results, because the virus has time to develop to a certain degree before it is checked by the action of the serum, and an active immunity results. Three of our artificially immunised animals have been treated in this manner, and now ten horses and one mule have been inoculated in the same way. For economical reasons, I began by using relatively large doses of serum to check the disease, and I now propose to diminish the dose of serum gradually until I ascertain what is the minimum dose necessary to control the action of the virus.

Experiments of this description occupy a good deal of time, because a fortnight must elapse in order to allow the serum to be eliminated from the animal's system before testing their resistance to the disease.

Besides these experiments, others are being conducted on lines which answered excellently in rinderpest, *i.e.*, the simultaneous injection of virulent blood with serum.

The encouraging results obtained, which I have recorded in this report, impress me with the conviction that a practical method of protective inoculation against horse sickness is within our reach, and I now intend to go on with the experimental immunisation of the shipment of young Argentine horses which arrived here on 3rd instant, six of whom are already under treatment.

This work I hope to complete by the end of March.

R. KOCH.

Hillside Camp, Bulawayo, 1904.

SCLEROSTOMUM ARMATUM AND *TETRACANTHUM* IN RELATION TO SOME DIGESTIVE DISORDERS OF THE HORSE.[1]

BY T. C. GRAVES.

MR. CHAIRMAN AND GENTLEMEN,—As it seems customary for the essayist to show cause why he has chosen a particular subject for his paper, I venture to put forward the following reasons:—

As far as I can remember, there has not been any paper dealing with parasites read before this Association for some time.

And, as the two *sclerostomes* are among the most important parasites

[1] Second Prize (Bronze Medal), Royal Veterinary College Veterinary Medical Association. Session 1903-4.

to which the horse acts as host—and as they are associated with many conditions of the alimentary tract of which colic is a symptom, I ventured to think that a discussion on such a subject would be both interesting and instructive.

I wish first of all to deal with the anatomy and supposed life-history of the two parasites.

ANATOMY OF *SCLEROSTOMUM EQUINUM* OR *ARMATUM;* ALSO CALLED *STRONGYLUS ARMATUS.*

This parasite is a nematode worm, having a straight rigid body, coloured grey or brownish red.

Surface of the body is smooth and formed of a chitinous cuticle, which is transparent, firm, elastic, and divisible into several layers.

Beneath the cuticle is the hypoderma, or sub-subcuticular layer; this is soft, granular, and nucleated.

Beneath this again is the musculo-cutaneous or muscular layer. This is formed of contractile cells, the majority of which are longitudinal, and often grouped in series. This layer is interrupted by four longitudinal lines—one on each side, one above, and the last below.

These lines sometimes acquire the same breadth as the muscular borders, and are thickenings of the hypoderma, in which run two or three excretory canals or aquiferous vessels, which unite into a single short canal that opens externally by a ventral excretory pore at the termination of the œsophagus.

The cephalic extremity has at its summit the circular mouth, which is widely open and rendered tense by several chitinous concentric rings, the innermost of which are furnished with fine teeth, whilst the outermost carry six papillæ symmetrically divided.

Digestive tube extends from one extremity of the body to the other. The mouth opens into the buccal capsule, which is an infundibulum sustained by a dorsal longitudinal rib, and has at the bottom two round sharp plates.

Buccal capsule is continued by an œsophagus, which is a narrow tube with thick muscular walls.

The intestine succeeding the œsophagus is a simple straight tube with thin walls, terminating in a rectum which is narrower and slightly muscular, and this again ends in the anus, which is ventral and terminal.

To this digestive tube in the anterior part are annexed glandular organs, so-called salivary glands.

Respiration is exclusively cutaneous.

Circulation is maintained by means of a plasmatic fluid that fills the visceral cavity, and this, bathing the viscera, is thrown into irregular oscillations by the contractions of the musculo-cutaneous envelope.

Reproduction.—Sexes are separate.

Male.—Smaller than female.

Males vary from 18 to 35 mm. in length.

Genital apparatus composed of a testicle, deferent canal. This testicle is simply a flexuous tube continued in a deferent canal that ends along with the digestive tube in a cloaca. This cloaca contains two speculæ. These speculæ are elongated pieces of chitin, serving to fix the female

during copulation. This latter action is also aided by the presence of a caudal pouch. This is an umbrella-shaped expansion provided with ribs. The ribs of the pouch are so arranged as to make it almost trilobate.

Female.—Females vary from 20 to 55 mm. long.

They have two filiform ovarian tubes arranged in more or less numerous convolutions, and these two tubes are continued by a wider portion—the uterus. This opens into a vagina, terminating in a vulva. Situation of the vulva—in the posterior part of the body.

Tail of the female is obtuse.

Eggs are about $\frac{1}{10}$ mm. long and $\frac{1}{20}$ mm. broad.

SCLEROSTOMA TETRACANTHUM—SOMETIMES CALLED *STRONGYLUS TETRACANTHUS.*

The anatomy of this parasite is somewhat similar to that of the *scleros armatum*, but with the following differences :—

It is smaller,—males varying in size from 8 to 15 mm. long, and females 10 to 17 mm. long.

Colour, white in prepared specimens; those fresh from body are generally red.

Body slightly tapering anteriorly.

Mouth circular, and provided with a crown of triangular teeth, and outwardly six papillæ—two small ones laterally, and on each side of these two others, conical and prominent.

Buccal capsule cylindrical.

There are two long lateral papillæ a little in front of the termination of the œsophagus.

Caudal pouch of the male is simply excised on ventral surface.

LIFE-HISTORY OF *SCLEROSTOMUM ARMATUM.*

Let us suppose that a horse whose intestines are infested with these parasites passes fæces in which are present the eggs of the worm.

This horse may pass fæces whilst drinking water from a pond or other pool of water, and some of the fæces containing eggs fall into it.

These eggs have an excellent medium for their further development in the stagnant water of the pond.

The eggs under favourable conditions become hatched in a few days.

The embryos that issue from them are cylindroid, possess long tails, and are about $\frac{1}{3}$ to $\frac{1}{4}$ mm. long.

These embryos grow gradually. Later their integument becomes folded and forms a kind of sheath in which the worm moults for about three weeks, and at the end of this time they part with their long tails (COBBOLD).

This moulting may be completed in the pond, or some of the water containing the embryos may be drunk by a horse, and the moulting is then finished in this host.

The water containing the embryos passes on to the cæcum. In the cæcum the parasites have an excellent situation for completing their development, being sufficiently far away from the digestive juices not to be affected by them.

They now attach themselves to the mucous membrane of the bowel, and penetrate its substance until they reach the circulatory system, and enter the abdominal arteries.

Taking a centrifugal course they reach the origin of the great mesenteric, and instal themselves there.

As a result of their activity an inflammation of the arterial wall is set up, resulting in an aneurism, which is filled with a ragged clot that adheres to the inner surface of the vessel and in which the worms are situated.

Here their buccal armature assumes its definitive characters; they increase in length, and commence to be sexually differentiated, although they do not copulate.

After a certain length of time passed in the aneurism, the worms leave it by allowing themselves to be carried by the blood, and in course of time reach the cæcum or colon, whose walls they again penetrate as far as the submucous coat, in which they form cysts or so-called tumours.

Finally, after remaining a more or less considerable time in the tumour they had caused the formation of, and having grown the sclerostomes, forsake it, enter the lumen of the intestine, attach themselves to the mucous membrane, become sexualised and copulate.

During their migrations from the intestine it is generally the anterior mesenteric artery which is favoured by their presence, but they are also found in aneurisms of the posterior mesenteric, cœliac axis, hepatic, renal, and spermatic arteries, sometimes occipital artery. Also in the muscles, such as those forming the floor and sides of the abdominal cavity, pancreas, ligaments of liver, and even the substance of the brain.

Although the above theory of the life-history is probably generally accepted, Leuckart asserts that the embryos should pass through an intermediate host before entering the intestine of the horse.

Colin, on the other hand, states that the armed sclerostomes are worms which migrate internally, and that their development is effected almost in one place, the ova being deposited in the mucous membrane by the female, and in the mucous membrane they develop to a large extent, so that there is no need for them to pass a certain amount of their time outside their host.

Again, I do not believe that every adult sclerostome found in the intestines has passed part of its life in the great mesenteric or other artery, because on examination of the intestines at post-mortem examination one may find large numbers of adult armed sclerostomes in the cæcum and colon; and yet further examination fails to reveal any other lesion in the circulatory apparatus.

LIFE-HISTORY OF *SCLEROSTOMUM TETRACANTHUM.*

This parasite inhabits cæcum and colon of the horse family in company with the armed sclerostome.

Usually found free among intestinal contents and also attached to mucous membrane. Frequently found coupled.

Eggs are laid in intestines of the host, and from the immense numbers of parasites often found there it is highly probable many hatch out in the intestine.

Those that pass out have a development very similar to that of the *Sclerostomum armatum.*

The embryos issuing from the eggs are thicker, tail is longer, and their movements are less active. They are taken into the intestine with the water the host drinks. In cæcum and colon they change their coats whilst enclosed in a shell. On leaving the shell they attach themselves to the

mucous membrane, which they penetrate, and encyst themselves beneath the epithelium. Here they form tumours or cysts similar to those described while dealing with the armed sclerostome.

Having reached their full development in the cyst, they then leave it, and attach themselves to the mucous membrane, from the blood-vessels of which they derive their nutritive supply.

Later they copulate.

DISEASED CONDITIONS DUE TO THEIR PRESENCE IN—

(α.) *Intestines.*

Commonest situation of these parasites is the cæcum and colon, and here they may be found in large numbers.

They hold firmly by their buccal armature to the mucous membrane, which forms at the point of contact a small dark prominence. They are most frequently met with in couples—two individuals forming an almost right angle, and adhering so intimately to the membrane that they may be preserved in this condition in alcohol.

These are the adult parasites.

Embryo parasites may be found in the condition of changing their coats and preparing to bore into the mucous membrane. Also there may be seen the intestinal tumours, varying in size from the head of a pin to a hazel nut, depending on size of worms contained in them. The tumours may also contain altered blood or pus, and there is more or less hyperæmia around the circumference.

The worm within is rolled upon itself.

Occasionally there is no worm, and then there is seen a small opening at the summit by which it has escaped.

Whilst these parasites attach themselves to the mucous membrane they not only have an irritating but a depleting action, consequent on the withdrawal of large quantities of blood. As a result of these actions, colic, catarrhal enteritis, great anæmia and weakness may result. They penetrate the mucous membrane, and whilst doing so they carry with them bacteria, and it is easy to conceive that the combined action of bacteria and worms would have a very irritating effect on the membrane.

If large numbers of parasites were present their action might result in a deep-seated enteritis.

The shell from which the tetracanthus emerges whilst moulting in the lumen of the intestines is supposed to be capable of supplying a nucleus for the ultimate formation of calculi.

(β.) *Blood-vessels.*

It is noticeable that these worms chiefly make their presence known in arteries, rarely, if ever, in veins. Reason is probably because in arteries they can be supplied with both oxygen and food.

Commonest situation of aneurism due to action of *Sclerostomum equinum* is on the anterior mesenteric artery or its branches. Aneurism formed as a result of their activity may be globular or cylindroid. Size varies from a pea to a hen's egg; sometimes may be enlarged to the size of one's wrist. It consists of a dilatation of the lumen of the affected vessel, with thickening of its walls.

Sometimes, although there are large clots inside the artery, there is no dilatation. External coat is usually thickened and indurated, according to age of aneurism.

Middle tunic is always thickened as a result of the activity of fibroblasts stimulated by the presence of worms.

The internal coat is always altered. Disease may vary from a thinning and erosion of the coat to ulceration, and even calcification.

Lumen of tube is occupied by a fibrinous deposit adhering to the internal membrane or remains of it.

At first it is comparatively tough and regularly consistent. Later it undergoes a softening, and presents a variety of colours. In this thrombus and broken-down internal coat the parasites can be found. The clot nearly always contains a canal in the middle for the passage of blood. The thrombus may be prolonged into the arteries before and behind the aneurism.

An important point in reference to the thrombus lies in the fact that as it undergoes softening the risk of portions being swept away and forming emboli in the arterial ramifications passing to the intestines is increased.

Similarly, if the thrombus extends to the aorta, portions may also be detached and be carried into the renal and iliac and other arteries.

Mr. King of Newport Pagnel, in *Veterinarian* of 1894, describes a *post mortem* where "aorta and mesenteric artery were both enlarged; for about 4 or 5 inches in front and behind the mesenteric opening the aorta was irregularly thickened, the inner coat was much inflamed and collected into transverse folds. At the mesenteric openings a lip or valve arrangement existed, and immediately succeeding this was an immense bulging, the endothelium of which presented very large folds."

"In both aortic and mesenteric aneurisms innumerable parasites were festooned together; without the slightest exaggeration I may say that thousands of these strongyles were present, mostly collected into circular masses varying from the size of a sixpence to a penny, which almost occluded the vessels. At several points the parasites could be seen making their way through the vessels."

HOW DOES THE ANEURISM ORIGINATE?

The old idea was that the worms attack the tunica intima; this becomes inflamed, ulcerated, and covered with fibrin. The inflammation extended to the media, and hence diseased processes so set up are of the nature of a deforming arteritis.

But, according to the latest view enunciated by Dr. Sticker, the worms find their way into the small blood-vessels supplying the arterial coat; and so by cutting off the blood supply produce a hæmorrhagic infraction in the coat. Whilst situated in the vasa vasorum the worms grow, and then they make towards the lumen of the tube, not by the way they came, but by working shrough the media and intima. The hitherto uninjured intima now appears raised in bladders, just beneath which the parasites are found. As a consequence of these bladder eruptions bursting—or sometimes even before they burst—the surface becomes coated with a material deposited from the blood, consisting of leucocytes, blood plates, and fibrin. This later constitutes a well-formed thrombus.

Whichever is the method of the formation of the aneurism, by the time that a well-formed aneurism has been formed the parasites are found in the cavity of the aneurism, either adherent to the wall or imbedded in some of the thrombus material that partially fills it up.

(To be continued.)

XUM

INJURIES OF THE DOMESTIC ANIMALS IN THEIR LEGAL ASPECT.[1]

BY LIEUT.-COLONEL J. A. NUNN, ARMY VETERINARY DEPARTMENT.

A RECENT case of maiming animals that occurred in the Midlands, which resulted in a conviction and sentence of imprisonment, has brought this subject somewhat prominently before the notice of the public. Furthermore, in disputes about injuries such as are caused by wire, running down in streets, railway and board ship accidents, there is a tendency of the courts, which is increasing, to call in expert evidence.

DIFFERENT CLASSES OF WOUNDS AND CAUSE.

Classification.—Nearly all writers on forensic medicine classify wounds according to their gravity, viz., into slight, serious, and fatal, the first being those that incapacitate for less than twenty days, the second for over twenty days, but without reasonable fear of death, the third those from which death may be feared, or if the victim lives incapacity for a greater or lesser period of time.

This classification is of more importance in human than veterinary medicine, as the penalties increase according to the gravity of the wound, whereas in veterinary medicine each case is judged individually, not so much by its gravity as its nature, cause, and situation, and what loss there is to the animal's value. As an instance, a severe injury of a stab in the quarter or axilla from a pitch-fork in the stable or a stake in the hunting-field will not cause the animal to depreciate in value anything like a small abrasion the size of a sixpence on the knee, although the one may lay him up for a long time and endanger life, whereas with the other he may be at work next day.

Under the French Civil Code wounds are classified as trivial, slight, severe, and fatal, and has in that country been proved to be a convenient division; and I propose to discuss these injuries under the sub-divisions of concussions, contusions, sprains, dislocations, fractures, wounds in general, gunshot injuries, and burns.

Concussion.—A concussion is the perturbation that takes place in an organ from a blow or shock on some distant part of the body, and although animals, from the nature of the work exacted from them, are particularly liable to such shocks, it is exceedingly difficult to trace the resulting concussion to the primary cause; in fact, the only ones that can be diagnosed with any reasonable amount of certainty are concussion of the brain and spine.

The former is characterised by stupor, somnolence, insensibility, incoordinate movement, sometimes by an irresistible desire to move in a forward or circular direction with a staggering gait, while in other instances there is general paralysis.

Spinal concussion is more frequent in small than large animals, as they are more likely to receive blows and kicks over the back and loins. It is characterised by total or partial paralysis, with paralysis of the rectum and bladder.

In animals rupture of the liver and spleen from concussion are almost impossible to diagnose during life, and as a rule they give rise to fatal

[1] Paper read before the Liverpool Veterinary Medical Society, August 25, 1904.

hæmorrhage; the same can be said about rupture of the diaphragm and bladder.

In certain cases of colic due to indigestion and engorgement of the stomach in the horse concussion from throwing himself on the ground will rupture the organ. The symptoms are so well known that I will not waste time by entering into them.

Contusion and Ecchymosis.—Contusions vary in degree from simple discoloration of the skin to disintegration of the subcutaneous tissues, in the first solution of continuity only implicating some of the cutaneous capillaries; in the second both the hard and soft tissues being completely disorganised. Contusions are of various forms, depending on the nature of the instrument with which they are inflicted, such as its size, shape, weight, force applied, and the angle at which it strikes the skin.

Slight contusions are, as a rule, only recognised in small animals with white skins. They are characterised by extravasation of blood into the connective tissue, ecchymosis, and infiltration, which usually appears directly after the injury. At first it has a blackish-red colour, running on into violet-green and yellow, disappearing on the twelfth or fifteenth day.

In severer forms the discoloration of the skin does not show itself for twenty-four to thirty-six hours, but there is a soft fluctuating swelling, sometimes known as exudative ecchymosis. If the exudation is scanty the blood will be absorbed, but if abundant it will not be, and an abscess form, which, if in a region where the tissues are hard, will give rise to considerable pain. In cases of very severe contusion, where there is complete disorganisation of the tissues, gangrene may set in.

Contusions to the lower parts of the limbs often give rise to deep-seated abscesses, with lancinating pain and great lameness, and when caused by wheels of carts and carriages there is great loss of tissue and the prognosis is bad. If the foot suffers injury from this cause there frequently is loss of the hoof or fracture of one of the phalanges.

Usually contusions over soft parts where there is a large mass of muscle are not dangerous except on the abdomen, when rupture of the stomach, spleen, or liver may take place: over bone there is always danger of fracture; but on every portion of the body the skin, from its elasticity, offers considerable resistance, which is of course greater when the subjacent structures are soft.

In a contusion pure and simple the skin is intact; if it is broken, then the injury is classified as a contused wound.

Sprains, Dislocations, and Fractures.—A sprain or strain is a forcible over-extension of the muscles or ligaments surrounding an articulation, and they are most frequently seen in connection with ginglymoid joints, as with these lateral movement is very slight. Sprains are more frequent in the horse than any of the other domestic animals, from the nature of his work, and most frequently in the fetlock. Next to this the coronet is most liable, then the hip, shoulder, and loins. All sprains are of the same nature, only differing in degree, and all are characterised by a greater or lesser degree of lameness.

Dislocations may be spontaneous or accidental, and be caused by external violence or muscular contraction. They are uncommon in the larger domestic animals, and the prognosis is bad, not only from the difficulty in effecting reduction, but from the impossibility of keeping the patient quiet for a sufficiently long time.

XUM

Like dislocations, fractures are serious in the larger animals, and, whether simple or comminuted, are usually not worth the expense of treating. An exception must, however, be made with those of the phalanges, if there is not displacement, and of the ribs and bones of the face, the latter two uniting rapidly if properly treated.

In the smaller animals fractures are easily set, and unite in a comparatively speaking short time.

Union takes place in from three weeks to a month in the carnivora, and from forty to fifty days in large animals, depending on the age and condition of the patient.

Wounds.—Wounds are classified according to the way or instrument with which they are inflicted: 1st, Incised wounds, or those inflicted with a cutting instrument. 2nd, Punctured wounds, or those inflicted by a stabbing instrument, or one that both stabs and cuts. 3rd, Lacerated wounds, caused by a blunt or jagged instrument or bites. 4th, Contused wounds, which are the result of a blow from a blunt weapon that is sufficiently violent to break the skin. 5th, Gunshot injuries.

Incised Wounds.—The injury inflicted by a sharp cutting instrument consists of a straight or curved section of the tissues, with sharp, clearly defined edges and acute angles, the lips being more or less separated according to whether they are in a parallel, transverse, or oblique direction to the long axis of the limb or body. This is more pronounced when the soft tissues are contractile and the wound is across the fibres, also if at the moment of its infliction the tissues are tense.

Usually the diameter of the wound is larger than that of the instrument with which it is made, and slopes from each end to the centre, forming a triangle of which the base is the surface of the body.

It is not always easy to determine the nature of a wound, as certain contused ones in the neighbourhood of superficial bones may appear to have been caused by a cutting instrument, and it is also difficult to say what is the weapon that has been used, especially when both section and percussion have come into play at the same time, and the lips of the wound are contused.

Incised wounds may cut the tissues into flakes or slices, and then there is always a loss to a varying extent. They heal by first intention or by granulation; in the first case leaving little visible trace behind them, in the second a cicatrix varying in character.

Punctured Wounds.—Punctured wounds all have the common characteristics of straightness and depth, usually they closely resemble the weapon with which they were inflicted. The direction in which the instrument is held must be carefully considered, if it is perpendicular to the skin there will be a small circular wound, but if obliquely, it will be more of an oval.

Punctured wounds are always smaller than the instrument by which they are caused. They are usually more dangerous than incised ones, but, everything else being equal, this depends on the depth to which they extend. Formerly the collection of pus in a punctured wound was supposed to be due to its small calibre, whereas in reality the part becomes contaminated through injudicious interference with contaminated probes, &c.

If the puncture is simple and only implicates the skin and muscular tissue, the prognosis is usually good, resolution taking place; but if it traverses a large vessel, aponeurosis, tendon, ligament, or articulation, or

if an important organ is injured, especially with an infected instrument, serious results are to be feared.

In animals punctured wounds are usually inflicted by stable forks, if maliciously on any part of the body, but if accidentally they are usually found on the lower part of the limbs.

Wounds from stakes are usually inflicted in the hunting field, and are more often found on the breast, or inside the thighs than elsewhere. The mouth is generally ragged, and there may be portions of bark and moss adhering, and complications arise from pieces of wood breaking off and remaining in the tissues.

Wounds in the feet from gathered nails are more usually met with in towns than in the country. The prognosis depends on the depth of the puncture and the tissues that are implicated, also if the nail itself is contaminated or not. The long French nails cause a worse injury than English ones.

If the weapon is too large to simply cause a puncture, and especially if it is irregular in form, it tears and bruises the tissues in its passage, such as hedge stakes and tines of harrows which are not very sharp and are square. Wounds of this nature are particularly likely to become gangrenous, and give rise to tetanus.

When the weapon is both sharp at the point and with a cutting edge, such as a knife or a sword, the wound is triangular, narrow, and clean cut towards the cutting edge, broader and contused at the back.

If the instrument is double-edged the wound will be in the form of two very acute triangles, with the bases in apposition at the centre.

In dealing with all punctured wounds a most guarded prognosis should be given, for even the most trivial and unimportant may rapidly alter in character and end disastrously.

Lacerated Wounds.—Lacerated and torn wounds usually have the tissues torn into one or more flaps, and are caused by violent shocks acting in an oblique direction, or by the struggles of the animal to free himself from some obstruction, such as when caught in wire. In this way horns are torn off cattle and the hoof off horses. Lacerated wounds, which are often complicated with rupture of tendons and ligaments and fractures, very rarely bleed much, and in process of healing present two distinct phases—elimination and cicatrisation. They heal but slowly, and the resulting cicatrix is often a great deformity, even if it does not impede the normal functions of the part.

Bites have the characteristics of punctured wounds caused by sharp instruments, contusions, and lacerations, depending on the animal by which they are inflicted.

The teeth of the carnivora, being sharp-pointed and conical, inflict all three varieties. When there is only a contusion the marks are easily seen on the injured part, especially if a full grip has been taken. The injury may be either a simple erosion or ecchymosis. If the bite has been harder, but the teeth have not met, there will be a number of punctures through the skin of variable depths, corresponding with the dental arcade.

If there is laceration it is more difficult to determine if the wound has been inflicted by a carnivorous animal or not, but the oval form will give some clue.

Among the herbivora only solipeds use the teeth as weapons of offence or attack, and the incisors being flat, the tissues are more crushed than

torn, and the injuries vary from a simple contusion to complete disorganisation and gangrene.

Contused Wounds.—If the skin is broken from the result of a blow the resulting injury is a contused wound. In some instances such wounds are of the same shape as the weapon with which they have been inflicted, but as a rule they are irregular in shape, with jagged edges. There is little or no hæmorrhage, and the exposed tissues are of a livid or dark purple colour, and in healing they go through the same phases as lacerated wounds, viz. elimination and cicatrisation.

Cicatrisation takes place slowly, and the scars are thick, irregular in shape, and depreciate the value of the animal. Contused wounds are common in the domestic animals, one of the most usual places being on the front of the knee, where, if severe, they may give rise to permanent injury, or even cause death, and even under the most favourable circumstances leave a lasting blemish.

Badly fitting or cared for harness also is a common cause of contused wounds, in the shape of fistulous withers, poll evil, or sore backs.

Certain contused wounds only implicate the upper part of the skin, and do not extend into the dermis. These are excoriations, and are seen on the front of the knees and inside the fetlocks, in this latter position caused by brushing.

When the dermis is injured the new hair on the cicatrix is of a different colour to the rest of the coat. In those cases that suppurate the cicatrix is bare.

Gunshot Wounds require a more particular description, not only from their special characteristics, but from the different injuries caused by different projectiles. A good classification of bullet and shell wounds is given by Dr. Delorme (*Traité de Chirurgie de Guerre*, vol. i. page 463) 1, Erosions, scratches, grooves. 2, Incomplete wounds or those terminating in culs-de-sac. 3, Complete perforations. 4, Abrasions of varying extent.

The fragments of shells cause contusions of different degrees, from slight ecchymosis to complete disintegration of the tissues.

Usually the edges and bottoms of grooves or guttered wounds are contused, ecchymosed, irregular in shape, and the edges inverted; although, on the other hand, they are sometimes so clear that they might have been cut with a knife. Incomplete wounds have an opening smaller than the bullet, but shell wounds belong to the domain of military surgery, and those gunshot injuries that interest the practitioner are from shot-guns and revolvers and sporting rifles.

Shot-Guns.—The gravity of the wound depends on the size of the shot and the distance from which it is fired. If only a short distance off, the shot will not spread, but enters the body in a solid mass, like a bullet.

A number of experiments have been made (Briaud and Chaude, *Manuel complet de Médicine legale*, page 316), which show that up to from 12 to 16 inches shot "balls," but beyond that distance the pellets, begin to spread out, and do not penetrate so deep into the tissues. The thickness of the skin, the nature of the tissues, and the charge of powder will all exercise an influence on the degree of penetration.

If the shot has been fired at a short range it is more dangerous than a bullet, but, on the contrary, less so if from a distance, in which case the shots remain encysted below the skin.

If black powder is used the orifice of the wound will be discoloured if the shot has been fired close at hand; but as nowadays many different smokeless powders are used, the absence or presence of this blackening cannot be relied upon in forming an opinion.

If the shot has been fired at a short distance off there may be wadding lodged in the wound, and in any case this should be searched for.

It should also be remembered that a single grain of shot is sometimes sufficient to cause death if it hits a vital spot, even from a considerable distance. A case came under my notice some years ago of a valuable setter being killed with a single grain of No. 5 shot at a distance of over 40 yards. The pellet had penetrated through the eye into the brain.

Bullet Wounds.—Bullet wounds are simple when blood-vessels, large nerves, and bones are not implicated, complicated when they are.

Contusions are caused by what are known as *spent balls*,—that is, have nearly finished their flight and most of whose force has been exhausted. There is a more or less circumscribed scar, which, after becoming detached, leaves a wound that heals up but slowly.

Erosions and gutters are caused when the bullet strikes the skin obliquely, and the more force it has the more irregular are the edges, which generally are lacerated, ecchymosed, and black. Guttered wounds are a long time in healing and leave marked cicatrices.

Incomplete wounds, or *culs-de-sac*, are caused by bullets whose force has been partly exhausted, but not to such a degree as to be classed as spent balls, or else those that strike a large mass of tissue which they have not force enough to traverse. In the majority of cases, "unless there is a splinter of bone or dead tissue that acts as a foreign body," the bullet becomes encysted and does no harm.

A complete penetrating wound traverses the part from one side to the other, and there will be an entrance and exit. If the bullet strikes the skin in a perpendicular direction, a piece is removed as with a punch, round, gaping, and even, the edges being contused, depressed, and diverted *inwards*. The exit wound is irregular and does not gape, and the edges are not contused, project, and pointed outwards.

The entrance wound is usually smaller than the exit or equal to it, but this is reversed when the shot is fired a couple of yards off. Expanding and explosive bullets make a large, irregular exit wound.

In its passage through the soft tissues the bullet bores a hole, which is facilitated by the rotary motion given to it by the grooves of the rifle. Muscle offers the least resistance, next aponeuroses and tendons. Bones are generally broken into numerous splinters or perforated, but sometimes they will turn the bullet. This more frequently takes place with round or low velocity projectiles than modern firearms. I have seen several instances of the curious courses bullets will take.

Burns.—Burns can be classified as true burns and burns caused by caustics.

(To be continued.)

Translations and Extracts.

TREATMENT OF PERIODIC OPHTHALMIA.

BY PROFESSOR GAYEWSKY (VARSOVIE), RUSSIA.

THE author has made a series of experiments regarding different methods of treatment on 32 cases, 10 of which were cured while 22 were unsuccessful.

Method of Treatment.	Number Treated.	Results.
1. Subcutaneous injection of 1 gramme hydrochlorate of quinine bi-weekly, with douches 1 per 1000 corrosive sublimate, and 2 per cent. solution atropine to conjunctiva.	3	Nil.
2. Subcutaneous injection of quinine as in No. 1; conjunctival injection of corrosive sublimate, 1 per 1500, bi-weekly, instillation of atropine 3 per cent. solution.	2	One cured.
3. Injection of quinine as in No. 1; douches as in No. 1 several times daily; instillation of atropine daily.	5	Four cured; one with slight lesion in fundus of eye.
4. Injection of quinine as in No. 1; instillation of atropine, 5 per cent. solution; compress with boracic solution.	2	Nil.
5. Sub-conjunctival injection of corrosive sublimate solution, 1 to 1500; atropine, 5 per cent. solution.	3	Nil.
6. Douching with corrosive sublimate solution, 1 per 1000; atropine and iodoform.	2	One cured; one lost sight of.
7. Subcutaneous injection of quinine as in No. 1, sub-conjunctival injection bi-weekly of terchloride of iodine, 1 to 300; douching with 1 per 1000 corrosive sublimate; instillation with atropine.	5	Cataract in three cases; slight disorganisation of vitreous humour in two.
8. Subconjunctival injection of terchloride of iodine as in No. 7; instillation with atropine.	1	Cure.

Method of Treatment.	Number Treated.	Results.
9. Same as No 8; iodide potash 1 gramme daily.	4	Nil.
10. Same as above, douching with corrosive sublimate solution.	2	One cataract, one slight disorganisation of vitreous.
11. Douching with corrosive sublimate, instillation of atropine.	4	One cure, one cataract, two disorganisation of vitreous humour.

The author considers that the methods of treatment now in vogue are of but little use, and that preventive measures have to be relied upon.

(*Russian Veterinary Medical Congress*, St. Petersburg, January 1903.)

CAUSE OF MOULD IN OATS.

BY M. BROCQ ROUSSEU.

OATS having a musty smell are often met with, and are known as *mouldy*, and horses as a rule will not eat them. Considering the importance of oats as a food, it is curious that writers on the feeding of animals remain silent as to the actual cause of this deterioration, which has been said to be due to a parasite, although the specific one has never been yet described; also it is not known if there is more than one species; and the question appears to have a practical as well as a purely scientific side to it, as it is possible that means may be discovered to prevent this alteration, as well as to allow of such oats being used. The following experiments were carried out with five different samples of damaged oats:—

No. I.—*Black Brie Oats harvested in* 1903.—A number of grains were dull with dirty grey spots on them, and on almost all, without exception, there were a number of minute white points. There was the characteristic mouldy smell.

I first attempted to cultivate the different species of organisms from the surface of the grains, using the usual nutrient media, also oat broth.

Oat Flour.—The oats were ground into a fine flour, water added, and placed in tubes in the stove for half an hour at a temperature of 120° Cent., care being taken that the flour did not burn.

Oat Starch.—The oat flour was exposed to a stream of water on a piece of fine muslin, the starch being washed out and collected, and treated as above.

Oat Broth.—100 grammes of bruised oats in a litre of water were boiled for a quarter of an hour, the starch turned into sugar by the addition of a 2 per cent. solution of hydrochloric acid, and again boiled for two hours. The fluid is then filtered till clear, and placed in a stove at a temperature of 120° Cent. for a quarter of an hour. The broth was divided

into two equal parts, one remaining slightly acid, the other neutralised with soda.

A single oat grain was placed in a number of tubes of these different culture media, and placed for three days in an incubator at 37° Cent., when the following organisms were isolated:—

1. A mucor.
2. A sterigmatocytis.
3. A cladosporium.
4. An aspergillus.
5. A penicillium.
6. A streptothrix.
7. Bacteria—Three coccii.
   „ One streptobacillus.

The problem was therefore simplified, as one of these organisms was the cause of the peculiar smell, and a succession of cultivations proved it to be the streptothrix, which was the subject of further study.

CHARACTERISTICS OF CULTIVATIONS.

1. *Aërobic Medium.*

Peptonised Gelose.—This is a good culture medium. At first the growth is a grey colour, firm in consistency, irregularly circular, with clearly defined edges, raised in the centre, and adherent to the medium. Later on the centre develops into a round white patch that is easily detached, and which gradually covers the whole growth, and in time spreads over the whole surface of the medium, giving off a slight smell.

Mannitol Gelose.—The growth is irregularly circular, raised in the centre, of a dull grey colour, glistening, semi-transparent, fissured in places, firmly adherent to the medium, and having a faint smell. It differs from the first growth in that there is no white efflorescence on the surface.

Glucose Gelose (5 per cent.)—No growth.

Gelatine.—Round white tufts which liquefy the gelatine. When this is complete effeorescence appears on the parts in contact with the air.

Peptonised Bouillon.—A white deposit at the bottom of the broth, which, when shaken up, is seen to be formed of round grey tufts, which later on project through the surface of the fluid, forming isolated white colonies covered with an efflorescence. The colonies unite and ultimately form a white film over the surface.

River Water.—No growth.

Potatoes.—The growth is dry and white, gradually extending over the entire surface of the medium. At the edges of the growth the potato turns pink, then blue; later on white or black, giving off a powerful mouldy smell.

Carrots.—No growth.

Oat Bouillon.—The growth is in the form of tufts, with a white appearance and a marked mouldy smell.

2. *Anaërobic Medium.*

The streptothrix does not grow in an anaërobic medium. An active culture was placed under those conditions, and the growth at once stopped, although not killed, as it afterwards grew luxuriantly.

MORPHOLOGICAL CHARACTERISTICS.

The tufts of the streptothrix consist of a tangled mass of filaments that are only distinguished from one another at the edges. They are sometimes straight, sometimes waving, varying in size from 0·5 to 1 m., and have short branches given off at a right angle. With age the filaments alter in appearance; in short thin ones there is a series of large granules, which at first sight might be mistaken for spores (fig. 4 *c*); in the larger ones there is a double row (fig. 4 *d*).

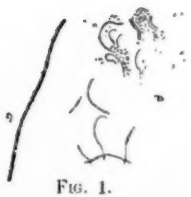

FIG. 1.

FIG. 2.

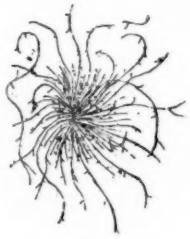

FIG. 3.

According to its age and the nature of the medium, the growth presents different forms.

1. *Oospora* (fig. 6).—The protoplasma consolidates at the end of the filament, and forms chains of oval spores one and a half times as long as broad, resembling a short bacillus, and which is the normal form.

2. *Bacilli* (fig. 3).—In addition to the filaments, there are others irregularly divided, which form chains, and which may be mistaken for foreign bacilli.

FIG. 4.

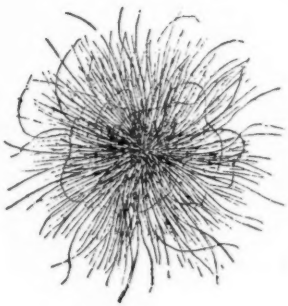

FIG. 5.

FIG 6.

3. *Fragmentation.*—The protoplasma consolidates in an irregular manner at different parts of the mycelium, leaving empty spaces of variable size.

STAINING.

The usual methods of staining were used, the organisms taking Gramm's stain well. Ziehl's solution decolorised rapidly, and the details were well shown.

POWERS OF RESISTANCE TO HEAT OF THE STREPTOTHRIX.

Experiments as to the powers of resistance of the streptothrix to both damp and dry heat were made, which showed that it was killed at 70° Cent.

If the streptothrix is the cause of the alteration, it should conform to the following conditions :—

1. It should be present in all damaged grain
2. When cultivated the damage should increase.
3. It should be reproduced as a pure culture.

I. THE EXISTENCE OF THE STREPTOTHRIX IN DAMAGED GRAIN.

This has been proved in two ways :—

1. *By microscopic examination.*—As has been mentioned, there are a number of small white points and patches on the oats. If a portion is removed with a fine needle and stained with eosine or Ziehl's solution, it will be seen to be formed of a mass of short filaments, some resembling the oospora, and others the bacilli described above. With a little practice these masses are visible to the naked eye.

2. *By cultivation.*—Pure gelose is not a good medium, but it grows well on it if peptonised, and it grows to the exclusion of all the other organisms except the coccus. Furthermore, the grains are covered with a white mould. Incubation is not necessary, as they grow at the temperature of the room.

II. THE GROWTH OF THE STREPTOTHRIX INCREASES THE AMOUNT OF ALTERATION IN THE GRAIN.

Moist heat increases the growth of the streptothrix to the exclusion of other varieties.

Tubes containing a plug of cotton wool and water were sterilised, and a damaged oat placed in each, so as to rest on the wool, which was kept wet by tilting up the tube from time to time. In process of time—from a fortnight to a month—a growth covered each grain, which microscopic examination showed to be the streptothrix.

III. REPRODUCTION.

The growth can be reproduced in two ways, either on entire or crushed seeds, which are placed in tubes and sterilised. This is not easily done, and they have to be exposed to a temperature of 120° Cent. for at least an hour. The streptothrix is sown in the tube, and in a few days there is a typical growth, which with the uncrushed seed extends over the whole of it, giving off the characteristic smell.

SAMPLES 2, 3, 4, AND 5.

The samples were obtained from Oise, Indre, Brittany, and Charente, and from each the same growths were obtained.

SOUND GRAIN.

The question thus arises, Is the presence of the streptothrix accidental or general, and does the grain only alter under certain conditions?

To test this oats were obtained from eighteen different places, and a single grain from each specimen was exposed to a damp moist heat. In about ten days they were all covered with white spots, which proved to be composed of streptothrix; out of fifty tubes, in two only a penicillium was discovered.

This proves—

1. That the streptothrix exists normally on all oats, and when it develops they become mouldy.
2. That when exposed to certain conditions of heat and moisture the organism develops and gives off the peculiar mouldy smell.

The facts that are of interest to the agriculturist are—

1. To avoid as much as possible contamination from the streptothrix, which exists in large quantities on sound grain, and no doubt even in the soil, so that the sheaves should be left on the ground as short a time as possible when harvested.

   In districts where it is customary to leave cut grain out in the fields, such as Brittany, mouldy grain is more commonly seen than in those where it is at once taken up. The practice of mixing grain is also favourable for the growth of the organism.
2. The storage of grain in the least favourable condition for the development of the streptothrix.

As has been proved, the parasite is killed at a comparatively low temperature, and it would appear that, if exposed to a moderate degree of dry heat before storage, the grain would remain sound.

MAKING DAMAGED GRAIN FIT FOR FOOD.

If exposed to a temperature of 80° Cent. for half-an-hour, mouldy grain loses all bad smell, and this fact could, it appears, be turned to practical use.

(*Bulletin de La Société Centrale de Médecine Vétérinaire*, May 26, 1904.)

A NEW APPARATUS FOR SECURING HORSES IN THE DORSAL POSITION FOR OPERATION.

BY M. G. VIDRON, V.S., FRENCH ARMY.

THE apparatus consists of two uprights united at the top 8 feet 6 inches in height above the ground, supporting a horizontal beam that is let into the wall. On this beam are two pulleys over which a chain runs, one end being attached to a windlass between the upright, the other supporting a bar that is slightly curved and pierced with several holes, into which a hook is fixed that supports a leather hobble.

1. Two jointed arms uniting the beam to the uprights.
2. Two side-bars joined by pivots to the uprights at their base, that can be fastened to the ground at the further end by catches.
3. A spiral hook.
4. A leather hood to protect the head, and a set of hobbles.

XUM

The apparatus can be fixed up anywhere that there is a sufficiently strong wall.

The side-bars when raised are kept in position along the upright by the chains, and it is advisable to have a large ring firmly fastened into the ground 2 feet in front of the catches of the side-bars.

There is usually no difficulty in getting the horse into position under the beam, where he is cast in the ordinary manner with hobbles.

The limb to be operated on is then removed from the hobbles, a side line having first been put round the pastern, the end of which is passed through the ring in the ground, so that it can be used as a pulley to replace it after the operation is over. The spiral hook is then passed through the buckles of the three remaining hobbles. An assistant unwinds the windlass, and the isolated limb is put into the hobble on it at one end of the suspension bar, and the hook through the remaining three hobbles into

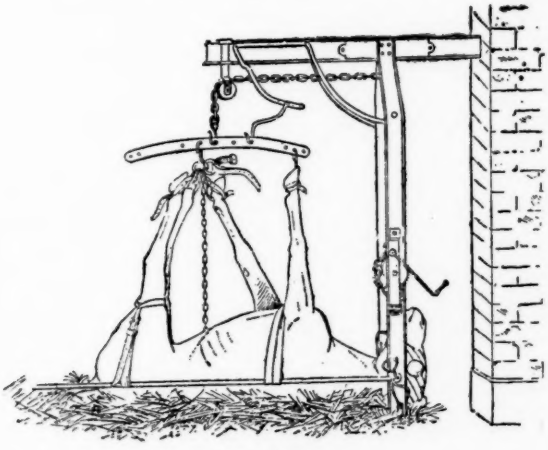

FIG. 1.

one of the holes at the other; the chain is then wound up till the isolated limb is completely extended.

The body is then given a quarter of a turn, so that the head, on which the hood has previously been put, is between the uprights.

The side-bars are then let down and fastened by the catches in the ground at the ends, the head fixed by means of ropes through the rings of the headstall to the uprights, the straps passed over the sternum, and the cross hobbles put on to the thighs, both being fastened to the side-bars as shown in the drawing; the curved catch is then lowered and the hook put through one of the holes in the suspension bar. In drawing No. 1 this is midway between the chain and fore limb, but at can be put at the end of the bar.

The animal is now in the dorsal position, the three legs counterbalancing the fourth, which is at the other end of the bar, and if he attempts to struggle the flexion of the three united limbs extends the

fourth. The two jointed arms on the beam check both lateral and downward strains, and the absolute immobilisation of the lower extremities of the limbs prevents sprains taking place if the animal struggles.

The whole process is reversed when the animal is freed.

Except for operations on the poll, neck, and withers, all others can be performed with the apparatus.

In the application of the cautery it is not necessary to turn the patient or change the limbs from the hobbles, but if line firing is used it is advisable to use irons with edges at right angles to the handle.

In the high operation for neurotomy the region is exposed, but in the low one the foot has to be taken out of the hobble, and a side line put round the fetlock, which can then be fastened to the hook. In the median operation the limb is sustained absolutely vertical. The operator stands in front of the limb in a line with it, the assistant, who holds the retractors, kneeling behind it. The blood flows from what is the lower lip of the wound, and does not obscure the field of operation in the way it does when the animal

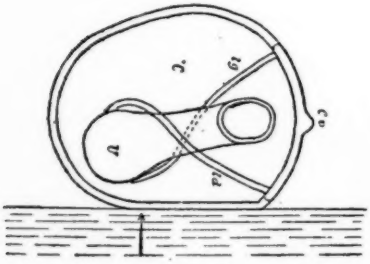

FIG. 2.

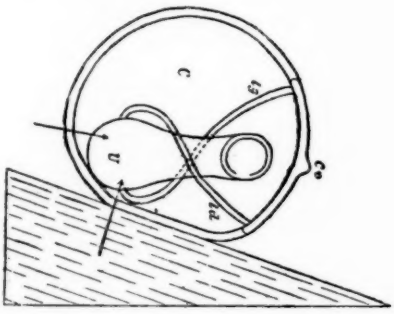

FIG 3.

is in the lateral position. In sciatic neurotomy the hind limb is isolated, and attached to the end of the cross-bar in the same manner as the fore one.

In Vinsot's plastic operation on the knee one of the hind limbs is isolated, and this will give a slight inclination to the fore ones, which facilitates the operation. After the part has been dressed, and the splint applied, if the animal is turned over on the opposite side he will get up without any trouble.

For arytenoidectomy and operations about the throat and head the patient is reversed, the tail being towards the uprights and the head fastened to the side-bars.

In operating on the abdomen, a long cross-bar should be used, so that a hind limb may be fully extended and the part exposed. It facilitates castration of cryptorchids, or the ordinary method by clamps or torsion, and the reduction of hernia.

The author also mentions that retention of the animal in the dorsal position is sometimes of service in cases of colic, and allows hot poultices to be applied to the abdomen. He also claims for this apparatus—

1. The possibility of performing an operation under aseptic conditions.

2. The convenience to the operator, who can remain standing, and need not crouch down into an awkward position; also that if two sides of a limb have to be operated on there is no necessity to turn the patient over.
3. That accidents, such as fracture of the spine, sprains, and asphyxia, are avoided.
4. That irritable and timid animals that cannot be placed in Vinsot's bascule can be operated on by this apparatus without difficulty.
5. That the apparatus is not expensive—about £13.
6. That it can be put up in a small enclosure or yard.

The author states that he has operated on over 600 horses with this apparatus, and never had an accident. He does not pretend that it is going to supplant all other means of securing animals, only that it is a convenient way of securing the dorsal position, and in it performing certain operations.

(*Recueil de Médecine Vétérinaire*, 30th June 1904.)

STENOSIS OF THE JEJUNUM IN THE HORSE.

BY HERR ZURN.

DIECKERHOFF, Friedberger, and Fronher all state that it is impossible by the symptoms to distinguish between intestinal stenosis and ordinary constipation. In both the progress of the disease is lengthy, and in spite of a fairly good appetite the patient rapidly loses condition.

As in the majority of cases the lesion is only discovered post-mortem, the author thinks that it might be useful to publish the clinical notes of a case he saw.

The patient was sent to the Hanover Veterinary School as he did not feed. He was in good condition and coat, the mucous membrane a pale yellow, temperature 39·5° Cent., pulse 65 per minute, respiration normal. He refused all food, and with difficulty drank half a bucketful of water in the day. No abnormal sounds were noticed on percussion, but the movement of the intestines on auscultation were heard to be loud and often repeated, especially over the small intestine. The droppings were soft, and had an acid smell. The urine was voided in small quantities, and contained neither albumen nor sugar, but a considerable quantity of indican and colouring billiary matter. The case was diagnosed as being acute gastro-intestinal catarrh.

Two 15-gramme doses of creoline, followed by bitter tonics, were prescribed, and all the symptoms vanished, the appetite returning, and for two days the patient ate his rations, consisting of 6 litres oats, 4 litres bran, and 2½ kilogrammes of hay. On the third day he refused all food, the former symptoms returning, with the addition of colic. These yielded to the same treatment, but the relief was never permanent.

By exclusion the author diagnosed contraction of the small intestine, first of atony, the quantity of food taken was too small to cause colic from indigestion, and as there were no direct symptoms, derangement of the execretory functions. The possibility of being able at one time to take a fairly large quantity of food negatived any disease of the stomach (glandular

gastritis or tumour of the pyloris), also the time after the feed (twelve to twenty-four hours), and the healthy condition of the organs that could be felt by examination per rectum.

On the other hand, the probabilities of stenosis of the intestines were indicated by—

A. The regularity with which colic and jaundice appeared after decomposition of the food which was not rendered aseptic by the bile.

B. The relief afforded.

The animal was destroyed during one of the intervals. There was entire absence of any signs of disease in any of the organs except the small intestine, several loops of which were adherent, and at which point they were greatly constricted, and which undoubtedly were the seat of the extra peritonitis that came on after each attack of indigestion.

(*Deutsche Thier. Woch.*, page 289.)

VALVULAR INSUFFICIENCY IN THE HORSE.

BY M. DAIGNEY, VETERINARY SURGEON, FRENCH ARMY.

MITRAL insufficiency is much more uncommon in the horse than aortic, especially so in young animals, and the case that has come under notice was an aggravated one.

The animal was a four-year-old mare, purchased at the remount depôt at Angers in November 1901, and sent as a remount almost at once to the 9th Regiment of Dragoons.

She was exceedingly thin and in bad condition, coat rough and standing on end, mucous membranes, &c. pale in colour. She was at once admitted to the infirmary, and placed on a course of treatment with but little effect.

When at rest the pulse was small thready, and impossible to count. The beats of the heart were weak, but not intermittent, and there was a long, soft murmur. The temperature was 38·1° Cent. After trotting the heart-beats were strong and confused, giving an impulse and shock to the sides of the chest. On auscultation sometimes only one beat could be heard, at others two. The whistling sound commenced at the systole, followed by a short silence, and sometimes a second sound, which was audible not only over the region of the heart but the pericardial zone, and even on the right side of the chest. According to the amount of exercise that had been given, it was low and prolonged or loud and short.

When sharply trotted round the riding-school she easily became blown, and in two or three minutes lost control of the hind quarters, hung her head, looked distressed and anxious, with the eyes staring and pupils widely dilated, and if not supported would tumble down. The heart-beats in this condition were very violent, agitating the whole of the chest, pulse imperceptible, and heaving of the flank. In one word, the animal was suffering from dyspnœa.

The diagnosis, which was plain, was mitral insufficiency, the symptoms

of which were systolic murmur and weakness of the pulse, with perhaps aortic insufficiency.

The prognosis was bad.

Treatment consisted of rest, good food, and nursing, but was without any effect.

Etiology is obscure. On joining the regiment the mare had not met with any accident. While in the infirmary she had had an attack of strangles, with a small subglossian abscess, from which she recovered in eight days, but the heart complications preceded this.

The progress of the case was slow during the three months she was under observation. Some days she would appear better, but gradually she got worse, and, being useless, was cast.

(*Recueil de Médecine Vétérinaire.*)

TUMOUR (HYALINE MYXOMA) IN THE SINUSES OF THE HEART.—OPERATION—RECOVERY.

BY M. CH. DARMAGNAC, VÉTÉRINAIRE EN SECOND, TIARET STUD.

THE patient was an eight-year-old mule that had been recently purchased for work on the farm. He was in good condition, but had a profuse thick discharge, that was fœtid and stained with blood from the left nostril. The membrane was of a blue colour, but not ulcerated. The submaxillary glands were hard, enlarged, but not adherent or painful. There was no deformity over the left sinus, and on pressure the resonance was normal but the part painful. The mallein test produced a negative result.

The animal was thrown on July 2nd, and the frontal and inferior maxillary sinuses trepanned, which revealed a tumour that filled up both the left frontal and maxillary sinuses; and as it was plainly seen that the operation would be a serious one it was postponed till July 4th, when M. Moussu's plan was adopted. Two new openings were made in the frontal sinus, the three being united by aid of a hammer and chisel, the opening measuring $3'' \times 2\frac{1}{2}''$, and in a like manner the maxillary $3\frac{1}{2}'' \times 2\frac{1}{2}''$. The tumour could then be seen filling up the maxillary and extending into the frontal sinuses. The large size of the pedicle rendered extirpation somewhat difficult, but it was at last successfully accomplished, and the bone carefully curetted. The tumour was the size of two clenched fists, of a pink colour, soft and gelatinous in consistency, lobulated and pyriform in shape; subsequent microscopic examination showed it to be a hyaline myxoma.

The subsequent history of the case was uneventful. The discharge stopped, and the wounds healed up by the 15th August, when the animal went back to work, and there was never any recurrence. Beyond two cicatrices there were no signs of the operation.

(*Recueil de Médecine Vétérinaire*, 15th Feb. 1904.)

MODIFICATION OF DIECKERHOFF'S TREATMENT FOR COLIC IN THE HORSE.

BY TH. MAGNAN.

AFTER Dieckerhoff had recognised the uselessness and danger of hypodermic injections of sulphate of eserine in colic due to overloading of the intestines in the horse, he introduced into veterinary medicine the intravenous injection of barium chloride, about which there is a diversity of opinion.

When first introduced the technique and dose was not fully understood, and from the accidents that took place the method was discredited from the following causes.

1. The toxic properties of barium chloride acting on the heart and giving rise to spasmodic contraction, causing death in a very few minutes.
2. Air getting into the vein during the operation and accidents following.
3. The formation of a thrombus at the point of injection from the action of the drug on the endothelium of the vessel.
4. Accidents from the use of impure barium chloride.

The experiments of Dieckerhoff, Hertwig, and Gruner show that the danger of introducing air into the vein has been greatly exaggerated. They injected from 40 to 50 grammes of water, and with it a certain quantity of air, into the veins of horses without any inconvenience, and in the fatal cases that took place death was not due to the air, but from either a too large or too concentrated dose being given, which acted on the heart before it could be detected in the blood.

Under these conditions, and especially by its action on the muscular fibres and innervation of the heart, it is easy to see how death could take place with all the symptoms of asphyxia (stasis in the jugular cyanosis of the nasal and buccal mucous membranes, thready pulse, &c.), which would be seen if a large quantity of blood entered the vein, and this deduction of Dieckerhoff's has been confirmed by Guerrieri.

In some cases, when a powerful drug has been injected, the patient will fall on the ground as if asphyxiated, but after a time will get up and gradually recover himself. In such cases no air has ever got into the vein, while, on the contrary, in others that it has there is not the slightest disturbance.

Dieckerhoff has now found that all inconvenience can be avoided by using small doses of barium chloride largely diluted, *i.e.*, 0·25 grammes in 15 of distilled water, repeated three or four times at intervals of twenty minutes, so that in such dilution there is no toxic action or the formation of a thrombus, the solution having lost its irritating properties.

Muller, however, mentions the case of a young horse in good condition that died after a single injection of 0·25 grammes of barium chloride in 10 grammes of water, Cadiot states that accidents frequently occur even with small doses, when toxic products have been absorbed from the intestine when there is old-standing heart affection, or when as a result of colic there is derangement of the intestine, all these facts have undoubtedly tended to discredit a drug which has great therapeutic value.

With a view to obviating these dangers several plans for its administration have been advocated.

Guerrieri advocated an intertracheal injection of hydrochlorate of morphia, 40 to 50 centigrammes in 20 grammes of water, followed in fifteen minutes by 1 gramme of barium chloride in 30 of water.

With intertracheal injection of 40 to 50 centigrammes of morphia he has never seen any serious disturbance. Such a dose does not of itself effect a complete cure. It is only palliative, and it is necessary to clear the intestine, and in such cases an intertracheal injection of barium chloride fifteen to twenty minutes after the morphia, acts well and without any danger.

It might at first sight appear that the action of morphia and barium chloride were antagonistic, but in practice this will not be found to be the case, as the morphia acts by allaying the hyperæsthesia of the extremities of the sensitive nerves of the intestine, and does not reduce the power of contraction of the muscular fibres. In giving the barium chloride fifteen minutes after the morphia the drug is absorbed gradually, and has time to define itself over the whole of the mass of blood. The spasmodic contraction of the intestine is relieved, and the peristaltic action increased, so that usually after about a couple of hours there is an abundant passage of both flatus and fæces.

The author quotes twenty cases that he has been successful with.

(*Il Nuovo Ercolani.*)

HYPERTROPHY AND DILATATION OF THE HEART IN THE HORSE.

BY PROFESSOR E. LIENAUX, BRUSSELS VETERINARY COLLEGE.

THE patient, an eleven-year-old gelding that had been sold with fourteen others by the Brussels Tramway Company, was brought to the hospital on Nov. 7th. He was unable to walk, fed badly, got blown with the least exertion, and after a few minutes at a trot stopped. He was in good condition, looked well, his pulse nearly imperceptible, mucuous membrane pale; slightly broken-winded; temperature 37·8 Cent.: all of which pointed to heart trouble.

The beats of the heart were stronger and longer than natural; but at its base there was an independent vibration which could be easily detected by placing one hand over the apex and the other a little behind the base. There was a marked degree of increased dulness on both sides, but that on the right was limited to a small space at and below the elbow.

The heart sounds were confused, but by careful attention four could be distinguished, two being loudest over the apex, the auriculo-ventricular, and two over the base at the openings of the vessels. The sounds followed each other with great regularity, the first coinciding with the vibration at the base, and appeared to be the presystolic sound characteristic of mitral contraction.

The second sound was nothing but the first normal one a little dulled, and the third and fourth; the duplication of the second normal one caused by the left ventricle not being so completely filled as the right, and the diastole and closing of the valves taking place later.

There was a marked jugular pulse, tympanitic resonance over the chest,

the vesicular murmur dull, and pulmonary emphysema. Certain symptoms, however, could not be explained by mitral contraction alone, viz., such extended cardiac dulness, and the strong heart-beats, that could be detected outside the usual limits.

The consequences of mitral contraction are dilatations and hypertrophy of the left auricle, the ventricle not being altered, which would account for the dulness; also the abnormal force of the shock of the heart and the extent over which it could be distinguished. Under the circumstances an unfavourable prognosis was given, but treatment was insisted upon. Alkalines were prescribed to stimulate the digestion, with 3 grammes daily of powdered digitalis leaves for four days. The pulse improved a little, but on the third day extreme œdema of the limbs, thorax, and abdomen set in, and the animal was destroyed.

The heart was enormously enlarged, the transverse diameter being 8 inches, vertical 16 inches. All the cavities were dilated and the walls thickened—left ventricle $2\frac{1}{2}$ inches, right $1\frac{3}{4}$ inches, inter-ventricular septum $2\frac{3}{4}$ inches, and auricles $\frac{3}{4}$ inches. The openings also were all dilated, particularly the auriculo-ventricular, which measured $5\frac{1}{2}$ inches. Water poured into the arterial trunks flowed into the ventricle. The endocardium was healthy and showed no trace of inflammation. The mitral valves were thickened, but there was no contraction capable of causing contraction of the orifice.

In the left auricle, about 2 inches from the mitral orifice, was a plug about $\frac{3}{4}$ of an inch long. The auricle was enlarged above this plug, and this enlargement coming in contact with the thoracic wall gave rise to the peculiar presystolic vibration that was heard over the base of the heart, and the presence of the plug caused the symptoms of mitral constriction. These lesions, no doubt, were caused by the severe work the animal had done, but in addition there was pulmonary emphysema, sclerotic induration of the postero-inferior border of the lung, caused by prolonged and repeated venous strain, as well as a certain amount of hepatic cirrhosis.

(*Annales de Médecine Vétérinaire*, March 1904.)

TRAUMATIC PURULENT ARTHRITIS IN THE HORSE

NOTES ON A CLINICAL LECTURE

BY DR. FAUERBACH, UNIVERSITY OF GIESSEN, GERMANY.

THE case on which this demonstration was given was one suffering from suppurative arthritis of the foot, treated from 29th December 1900 to 12th February 1901, when he was destroyed. The case was complicated with anchylosis.

1. *Anatomical and Histological Changes.*—The usual pathological changes take place in arthritis in the following manner:—When the articulation is penetrated the synovial membrane is first implicated in the inflammatory process. The synovia is turbid, of a grey or yellow colour, and the consistence of cream or honey, changing to a thick brown fluid of a putrid smell, full of air bubbles, leucocytes, endothelial cells in process of undergoing fatty degeneration, pus corpuscles, and various micro-organisms. These organisms attack the whole membrane, the condition of the part favouring their growth, and for this reason the whole articulation is

involved in the inflammatory process. At the same time the synovia thickens, the blood-vessels and lymphatics are engorged, and later on filled with thrombi, the parts becoming swollen, and abscesses form in the neighbourhood of the joint. The cartilage cells proliferate, and the cartilage of encrustation is disintegrated in places, leaving the bone bare. The bony tissue is invaded, ostitis and periostitis set up, and all conditions favourable for the formation of anchylosis provided.

2. *Symptoms.*—There is almost invariably a profuse discharge of purulent synovia. The only cases in which it is absent are those where the fistula is oblique and the surrounding tissues much swollen, or where it is obstructed with a thick clot. Then there is a hot œdematous and very painful swelling, embracing the entire articulation, which is diagnostic of the injury. If the seat of injury is in the foot, abscesses form round the coronet with characteristic fistulæ. In cattle the swelling and abscesses are usually localised at the back part of the coronet.

The weight is usually carried on the toe, but most authors declare that at the commencement of the attack no weight is put on the foot at all. Fauerbach states that he has only seen the joint flexed when suppuration is far advanced, not only in the joint, but surrounding tissues, when this is done to an extreme degree, so as to give relief from the pain caused by the tension exerted on the inflamed parts, as well as the pressure on them from the weight of the body. With regard to this pain the practitioner must consider the possibility of fracture, sprain, or luxation, and be on his guard that these are not overlooked.

In addition to these general symptoms there are those of fever.

3. *Treatment.*—This is entirely preventive. If a wound exists in the neighbourhood of an articulation it should not be probed or examined, but be treated with antiseptics, which in fact should be invariably used in every case, both with the wound and surrounding parts, from which the hair should be shaved, and the skin carefully washed and disinfected, the fistula curetted, and any shreds of tissue cut away.

Vesicants are not recommended, and old cases, in which there is a thick discharge of purulent matter, had better be made away with.

(*Monatshafte für prakt. Thierheilkunde.*)

THE PREVENTIVE AND CURATIVE TREATMENT OF STREPTOCOCCI.

BY PROFESSOR THOMASSEN, UTRECHT VETERINARY SCHOOL.

SINCE the discovery in 1883 of the streptococcus of erysipelas by Fahleisen the same type of organisms has been found in both men and animals in widely different diseases.

Rosenbach, Ogston, and Passet discovered the *Streptococcus pyogenus* in the pus from abscesses; Weichselbaum isolated a streptococcus in ulcerative endocarditis in man; Fraenkel in endometritis; Lannelongue and Achard in osteomyelitis; Lœffler, together with a specific bacillus, in diphtheria, also in typhoid fever, scarlatina, and numerous other diseases; and Kruse and Pansini classify the diplococcus of pneumonia among the streptococci. The importance of this class of micro-organism in Veterinary science is now recognised.

In 1888 Schutz isolated the streptococcus of strangles, and reproduced

the disease in the horse by inoculation with pure cultures, also in "petechial typhus" or "idiopathic anusaria," following after strangles and pneumonia as well as vaginitis, and Lignieres has found it in the blood and œdematous swellings.

In influenza and infectious pleuro-pneumonia of the horse (*Brustseuche* this latter observer has found two organisms, the most active a pasteurella and the diplococcus of Schutz, and has sought to identify it with the streptococcus of strangles. In 1847 he stated that the serum of the dog that had been inoculated with the streptococcus of strangles was rendered immune to the diplococcus of Schutz, but Bongert failed to obtain this result.

Lignieres also states that the diplococcus of Schutz becomes identical with that of strangles after passing several times through the horse. Bongert has after three passages obtained long chains that take Gramm's stain, but which did not reproduce strangles in the horse. Hall repeated these experiments with a like result. Nocard and Mollereau have isolated a specific streptococcus in chronic mammitis in the cow as well as the enzootic form known in Switzerland as "*gilbergalt*."

Both polyarthritis in foals, and rhuematoid arthritis with endocarditis in the cow, are due to streptococci, as well as that form of arthritis that follows puerperal infection.

The other diseases proved to be due to streptococci are peritonitis following castration, infection of wounds, and certain classes of septicæmia and pyæmia; in fact, it cannot be denied that infection from this cause is as important in animals as man, and exists to an extent that was never thought of twenty years ago.

General Characteristics.—Streptococci are immobile, and do not form spores. They grow in peptonised broth, and in some special cases glycose, and if the serum of horses or rabbit's blood is added to the broth in the proportion of two or three of serum to one of broth it will preserve their activity. Gelose is the best solid medium, but they grow very badly or not at all on potatoes. On gelatine they grow slowly, and in some cases liquefy it slightly, especially saprophytes.

Pasquale first called attention to the formation of pigments, the colouring material being deposited at the bottom of the broth, also in the water condensed from the gelose the colour varies, being different shades of yellow, orange, and blood-red.

They soon lose their virulency in broth, but Marmoreck has shown that, on the contrary, it is preserved for a year and more in the fluid of ascites to which one-third of bouillon is added.

There is no fixed rule as to the virulency; white mice and rabbits are most susceptible; guinea-pigs, rats, and dogs are usually altogether refractory, but a series of passages increases it.

Streptotoxines act but feebly on animals, and for a long time it was considered doubtful if immunity to them could be conferred. They grow badly in a filtered bouillon in which another species of streptococci has been grown, wherein most other micro-organisms are not in any way affected.

Varieties.—Von Behring and Lingelsheim attribute a certain importance to the length of the chains that are seen in fresh cultures, and state that the long chains (*S. longus*) are more virulent than the short (*S. brevis*), and according to the former observer the *S. longus* can be subdivided into different varieties according to the degree of

turbidity they give rise to in the bouillon and the character of the deposit thrown down. Subsequent observations, however, have shown that the length of the chains is not a constant characteristic.

Other observers consider the differences in the growth on various media a criterion, and no doubt in the case of the streptococcus of erysipelas and *Streptococcus Pyogenus* this is the case.

The variations in virulency is also important, as we know that the streptococcus of many diseases in man is inert with animals, also that a variety that in one species of animal will produce disease virulently will only have a feeble action in another.

The streptococcus of strangles, it is true, has a specially virulent action on the horse, and probably the same applies to others, such as that of mammitis in the cow and ewe.

The power of agglutination by streptococci of the serum of immunised animals has also been looked on as a means of differentiation, and Aronson in 1892 stated that in this respect there was no difference between those of erysipelas, scarlatina, arthritis, septicæmia, &c., the serum of a horse immuned with any streptococcus being active with the others and agglutinating quite indifferently. This author, however, used cultures of high virulency that had been passed through the mouse and rabbit.

On the other hand, Meijer is of opinion that the serum of a horse immuned by one specific streptococcus will only agglutinate with that particular one.

Continuing his experiments, Aronson used twenty different sorts of streptococci, "which had not been passed through any animal," to render horses immune with bouillon cultures eight hours old that had been shaken up every thirty minutes, and found that the serum from each horse only acted on that special variety of streptococcus with which it had been treated; others were only slightly agglutinated or not at all, even those of the same disease. That is to say, that the serum of a horse inoculated with seven different cultures of the streptococci of scarlatina would only agglutinate these seven, and not an eighth or ninth that had not been used, and the same was observed with puerperal septicæmia and articular rheumatism. This shows that agglutination is only an *individual* reaction and is useless to identify species.

According to Moser and Pirquet (October 1903) the process of agglutination is an argument in favour of the streptococcus of scarlatina being a specific one, as serum from two horses that had been inoculated in a solution of 1 per 1000 agglutinated any scarlatina streptococci, whereas with others the reaction was either very feeble or *nil.*

This question is of great practical importance, on which, to a great extent, the success of serum therapeutics depends, although, no doubt, it is sufficient to be able to differentiate between those that are of human and animal origin, for Aronson has shown that the streptococcus of strangles loses its characteristics after several passages through the mouse.

The author has made certain experiments with different streptococci that are of practical importance:—

1. The organism from human angina is not virulent to the rabbit, even in large intravenous injections.

2. The same result was obtained with those isolated from abscess in the hand and lung.

3. That of Marmareck, grown in broth and ascitic fluid, was extremely virulent with the rabbit but not with the dog.

4. Diplococci from pus, obtained from a foal suffering from purulent polyarthritis and a large abscess in the left thigh, killed a rabbit in twenty-four hours that had received ½ cc. of the culture in broth. The lesions were those of septicæmia, and cultures of blood from the right side of the heart reproduced the diplococci.

A dog weighing 35 kilogrammes was inoculated with 2 cc. of a culture in broth under the skin. He lost his appetite, the temperature rose to 40° Cent., and the respiration increased in frequency. On the second day a profuse diarrhœa set in, and he died in forty-eight hours after the inoculation with lesions of septicæmia and hæmorrhagic gastro-enteritis.

Culture of the same organisms in peptonised broth, retransferred every forty-eight hours, in eight days became innocuous in both the dog and rabbit.

5. An entire horse was castrated, all the ordinary antiseptic precautions being taken. The next day he was off his feed, with a high temperature, which on the third day rose to over 40° Cent.; pulse fifty-five per minute, small and weak, and conjunctiva a dirty red colour. The sheath was slightly œdematous, and there was a clear serous exudation from the operation wounds. He was treated with subcutaneous injections of collargol in 50 centigramme doses twice a day, but the patient died on the seventh day from diffused infectious peritonitis.

The exudate in the abdomen contained a streptococcus which in broth grew in chains, but was inert even with the rabbit.

6. The *Streptococcus longus* from mammitis in the cow was quite inert.

7. The *Streptococcus brevis* from frontal suppuration in the horse was very virulent with the mouse, rabbit, guinea-pig, and dog, but was not fatal with white rats. Dogs were killed in twenty-four to forty-eight hours with 1 cc. culture in broth under the skin. In peptonised broth it retained its virulence for five months when transplanted every five days.

The pus contained a short streptococcus which grew on gelose in twenty-four hours, but on gelatine at 22° Cent. the development was slower. Puncture cultures gave small rounded colonies, and the medium was slightly liquefied on the surface. No growth was obtained on potatoes. Broth became turbid in a short time; after twenty-four hours a deposit was formed that disappeared when shaken, and in a few days a grey deposit was formed, the rest of the fluid being clear. The organism took all the aniline stains, but was decolorised with Gram's.

This microbe differs from all known species, especially from any of the streptococci of human origin, on account of its great virulency with the dog. Rabbits inoculated subcutaneously with ¼ cc. are killed in twenty-four hours from septicæmia, with gastro-enteritis, and in one case croupal pneumonia. White mice were very susceptible, but with white rats only a temporary disturbance was produced with ½ cc. of the broth culture; guinea-pigs were killed with ½ cc.; a large bulldog received ½ cc. subcutaneously. After three hours he refused his food, and suffered from repeated attacks of vomiting, with the temperature over 40° Cent. The next day profuse fœtid diarrhœa set in, and he died on the fourth. There was intense gastro-enteritis, and the lesions of septicæmia, with considerable œdema, at the point of inoculation.

Broth cultures, three and four days old, were passed through a Chamberland filtre, and 4 cc. injected subcutaneously into rabbits, with negative results.

In Marmoreck's serum the streptococcus grows in long chains, but the

culture was not so rich as in broth; 1 to 2 cc. injected subcutaneously in rabbits produced temporary dulness for twenty-four hours.

Treatment is preventive and curative. The former consists in the use of preventive serums, curative also in the use of serums and certain preparations of silver, viz., collargol and ichtargan.

(A.) *Anti-streptococcic Serums.*—The serum is obtained either from animals that have been already accidentally infected with such, those that have recovered from strangles, or those that have been subjected to a series of inoculations with an organism of known strength that may be either natural or artificially increased, and a large number of different sorts of serums have been produced by this method.

Marmoreck has obtained an active serum by treating horses with human streptococci, the virulence of which is increased by passing it through a series of rabbits; this serum is monovalent. He has also obtained a polyvalent serum by using different streptococci from both men and animals.

Bulloch-Ruffer used the streptococci of erysipelas, strengthened by passing it through the rabbit. Denys has obtained a polyvalent serum by using different streptococci, and Menzer and Moser the same—the first with that of angina, the latter scarlatina.

The Institute of Hœchst have prepared a serum under the name of "gourmine," or a preventive against strangles; also Piorkowski and Sess in 1903. Delvos (*Berliner Thierarztliche Wochenschrift*, 1898) has treated 97 cases by this plan with success; also Jess in 1901 and Angerstein, in 1902, although the serum has been treated to 70° Cent., and had 0·5 per cent. carbolic acid added to it. In the hands of Schnorer (1903) the result, however, was *nil* (*Revue Générale*, vol. ii., 15th December 1903, page 647). So it would appear that the properties of serum are variable and of little practical use.

Gourmine has been used by Jelkmann of Frankfort; 78 cases were treated by him at Hœchst, with 50-gramme doses. They were newly imported Danish ponies, which usually develop strangles shortly after their arrival. Those not attacked escaped, and in those that were ill the fever, cough, and nasal discharge were greatly decreased. Other practitioners report the same good results.

Marmoreck's serum has also been used since 1898. The monovalent serum has been employed with a certain amount of success in idiopathic anasarca by Lignieres, but it has no action against strangles. His polyvalent serum has, however, since 1903 been largely used in France, especially in the army, with excellent results in case of strangles, being used in 10 cc. doses two or three times per diem, and both in Italy and Germany it is highly spoken of.

(B.) *Silver Preparations.*—Amongst them collodial silver, or Crede's collargol, particularly merits attention. Employed at first with the human subject in cases of suppurative, or septic diseases, it was used by Dieckerhoff in 1898 in anasarca, complicated with suppuration in the horse. He also demonstrated that as an intravenous injection it was harmless in a 1 per cent. solution.

Its use has since extended very rapidly, and 50-centigramme doses have been given. The author has only used it in two cases, but in both the œdema and petechia generally diminished on the second injection.

Dieckerhoff has used it in the subacute form of strangles, but the results have not been encouraging; in fact, Baumgart in 1902 found it inferior to

many other agents. It has also been used in the polyarthritis of foals, gangrenous coryza, and septicæmia.

In 1901 Professor Wenckebach of Groningue used it successfully as an intravenous injection in two cases of streptococci, endocarditis with septicæmia in the human being; but, on the contrary, Hindes and Balard-shew consider that in the blood it not only has no antiseptic action, but is positively dangerous, and Klimmer, that in the intestine its bactericidal action is very slight.

Bredig (*These de Leipzic*, 1901), writing on the colloids of metals, considers them as "inorganic ferments," and that in the presence of small quantities of these agents reactions that usually take place slowly and insensibly are brought about suddenly and violently, and no doubt the chief importance of colloids as regards therapeutics and biology lies in these properties.

Bamberger (*Berliner Klinische Wochenschrift*, August 1893) experimented with collargol on himself. When several applications had been made, each rubbed into the skin of the leg for thirty minutes, after the lapse of five hours, there was a great increase in the number of leucocytes. Crede's collargol is soluble in the proportion of 1 per cent., and at this strength can be used as an intravenous injection, but subcutaneously it is but slowly absorbed, and its local reaction is so great that in man it is dangerous to make use of this method. Kranenburg and Pekelharing have, however, discovered that if dissolved in a 1 per cent. solution of nitrate of sodium it is easily absorbed subcutaneously even in man, and in the dog and rabbit this takes place so quickly and completely that 5 to 10 gramme doses disappear almost at once, leaving no trace of the metal behind. In the horse the process is slower, as a flat tumour will remain a fortnight afterwards, containing brown patches from the precipitated silver.

Lately a new preparation has been put on the market which is soluble in the proportion of 5 per cent. in a 0·9 per cent. solution of chloride of sodium, and which is perfectly absorbed by the horse; it also preserves its properties indefinitely, which the first preparation of collargol did not.

Ichtargan is a 30 per cent. compound of ichthyol and silver, it is an amorphous powder easily soluble in water, and is employed in streptococcic diseases externally in a 1 per 1000 solution, or $\frac{1}{2}$ per cent. ointment, internally in $\frac{1}{3}$ per cent. solution. Bass treated three cases of anasarca and two of strangles successfully by an intravenous injection four times per diem of 50 grammes of a 1 per cent. solution, and Muller has used an intertracheal injection of 20 to 30 grammes of a 3 per cent. solution three times per diem.

The results of all these observations show that the streptococci are of great practical importance in veterinary practice, but that the identity of the different types has not been satisfactorily established.

The identity of the human and animal species appears to be established by their pathogenic properties, those of man seeming to have but little influence on animals, but the most virulent are those that have been isolated from a wound or abscess.

The treatment appears to be protective serum, and it is only in anasarca that collargol is inactive, but the value of polyvalent serum has been fully proved.

In strangles the specific monovalent serum is the preferable. For external use ichtargan is preferable to collargol.

(*Revue Général de Médecine Vétérinaire*, 15th March 1904.)

XUM

TO OUR READERS.

We beg to announce that with the January number a series of Original Articles is commenced, from the pen of Lieut.-Colonel Nunn, on "Veterinary Toxicology." It is expected to publish these articles in book form at the conclusion of the series.

PART II.—SPECIAL TOXICOLOGY.

BY LIEUT.-COLONEL J. A. NUNN, F.R.C.V.S., F.R.S.E., C.I.E., D.S.O., BARRISTER-AT-LAW, DEPUTY DIRECTOR-GENERAL ARMY VETERINARY DEPARTMENT.

(*Continued from page* 105, *Vol. X.*)

Determining causes.—There are a fairly large number of cases reported of animals being poisoned by licking newly painted fences, &c. Bojoly reports one where paint containing white lead was splashed over the grass where a paling was being newly painted, and Salembier and Lavigne from the cattle licking the same substance. Collins mentions one where some clover had been top-dressed with cinders from a lead work, and Dewer where stable manure had first been used in the manufacture of carbonate of lead by the Dutch process. Mosselman has seen it take place where road scrapings have been put down on grass. Cartwright (*Edinburgh Veterinary Review*, 1863) reports a case of some cows being poisoned by eating the lead foil wrapped round tea; and in the *Veterinarian*, 1864-65, and Taylor on *Poisons*, 402-439, cases of sheep and cattle that were grazing on rifle ranges and being poisoned by the fragments of bullets are mentioned. Some years ago a number of the Royal buckhounds were poisoned in the Ascot kennels by drinking water conveyed through lead pipes.

Channels of introduction.—In the majority of cases lead enters the system through the mouth, although it is possible it might be absorbed through a mucous membrane, such as the uterus. In the human being workmen are affected through the respiratory organs, but this is not likely to take place with animals. The dog may become affected through the application of ointments containing lead.

Toxic dose.—There is much divergency of opinion on this point. Rey has given dogs large doses of carbonate and sulphate without any effect, and Guiserone had the same result when two grammes were given daily for twenty-seven days, although lead was detected in the urine. Trousseau gave large doses to cats, and one dog received from 2 to 60 centigrammes daily for ten months; in neither case was there any ill result, although there were considerable quantities of lead detected in the organs after death. On the other hand, Combemale and Francoise produced symptoms of lead poisoning in dogs with from 1 to 5 centigrammes of chloride of lead daily for a month. Hertwig found in the horse that a pound of the acetate

was fatal, and a smaller quantity in cattle. Prinz gave half an ounce daily for three days to cows that produced ill results, but was not fatal. Mecke gave cows 8 ounces in two days, death taking place in from one to fourteen days afterwards. Orfila found that half an ounce killed dogs in from nine hours to two or three days if prevented from vomiting; and Kaufmann gives the following as toxic doses:—

Cattle, ...	50 to 100 grammes.
Horse, ...	500 to 750 „
Sheep, ...	30 „
Pig, ...	8 „
Dog, ...	10 to 25 „

Absorption.—There is usually no local action except in the case of acetate of lead, which is an astringent, and the effects are not manifest till after absorption takes place. Miahle thinks that lead is absorbed in the form of a chloride, but other authors, amongst whom is Millon, consider it to be albuminate of lead, and is as such transported by the red corpuscles, "not the serum," to the various organs of the body. Absorption is facilitated by the poison remaining in the stomach or small bowels, and purgatives, together with sulphates and sulphuretted hydrogen, retard it, as the latter form insoluble compounds of lead. The alterations that metallic lead, "such as the *débris* of bullets or lead foil," undergo before it is absorbed are complex and not properly understood; but no doubt the change is a long time taking place, which accounts for it in many cases doing but little harm, and being expelled naturally. The longer it is retained the greater are the chances of absorption taking place, as in the process of digestion compounds such as lactic and butyric acids are formed, which act on the metal and render it soluble.

Circulation and deposition.—After absorption the poison passes into the circulation, and its first effects are on the blood, but the whole body is influenced by it, more especially the nervous system. A considerable amount is deposited in the bones, where it is detected as a phosphate, and in the liver, where, according to Gautier, it forms an albuminoid precipitate and an insoluble salt. It can also be detected in the kidneys, brain, and muscles.

Ellenberger fed a sheep with 164 grammes of acetate of lead, extending over a period of four months, and found the following proportions in the various organs:—

Liver, . . .	Grammes	0.065 per cent.
Kidneys, . . .	„	0.047 „
Bones, . . .	„	0.032 „
Nervous system, .	„	0.018 „
Muscles, . . .	„	0.0084 „

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Elimination chiefly takes place through the bile and urine, but a certain amount passes off in the saliva and perspiration. According to Melsesis, it is assisted by iodide of potassium, which unites with lead compounds, rendering them easily eliminable.

Symptoms, Acute.—The symptoms sometimes continue in a more or less aggravated form for weeks or even months. There is loss of appetite, with colicky pain, but these latter are not so continually present as in the human subject; and at first the disease may be mistaken for stomach staggers in the horse and tympanitis in cattle. The limbs become paralysed, and the animal suffers from cramp, with progressive atrophy of the muscles, the extensors being more severely affected and involved than the flexors. If the case runs on for any time paralysis of the hind quarters sets in, and it would seem that the motor nerves are more affected than the sensory. In the horse a cough sets in, and the animal becomes a roarer. Schmidt has seen a number of such cases in lead works in Germany, and he states that such horses may become roarers without manifesting any other symptoms, although after death he has detected considerable amounts of lead in their bodies, and that some of them have lived under these conditions for years, if the danger of asphyxia is prevented by performing tracheotomy.

There is also a rough, staring coat, with a tucked-up abdomen and general unthrifty appearance, a slight amount of fever and difficulty in breathing, but the pulse is usually not much over 60 beats per minute.

Cattle are much more sensible to the effects of lead than horses, and the symptoms appear very suddenly, without any warning, usually seven or eight days after the poison has been taken. There is loss of appetite and rumination; the cow goes off her milk, and obstinate constipation sets in. The limbs are drawn together, the back arched, with the head being down, and there is great loss of condition.

In cattle the various complications are almost invariably seen. The eyeball is retracted in the orbit, giving the face a haggard appearance, and vision is dull, even if the patient is not altogether blind. Convulsions set in, alternated with periods of calm, and during the fits there are violent rigors, tremors, grinding of the teeth, and a great discharge of frothy saliva from the mouth. The pulse then becomes small and thready, the heart-beats imperceptible, and the respiration accelerated.

In certain cases delirium sets in, the animal bellowing, and even biting or butting at imaginary enemies. If let loose he will keep turning round in a circle or pushing his head against a wall; if tied up, will hang back on the halter till he falls in a fit of convulsions.

During the intervals the patient is semi-comatose, lying in unnatural positions, or if placed in such not attempting to rectify them, and continually champing the jaws.

Death takes place sometimes within a few hours, but the patient may linger for some days.

Chronic.—Chronic lead poisoning is seldom seen in cattle, on account of their peculiar susceptibility to this metal. The patient becomes anæmic, and gradually loses condition, the hair standing on end; the skin is hide-bound and corrugated; the appetite capricious; mucous membranes pale or yellow in colour, with a characteristic blue line on the gums. There sometimes are attacks of colic of a varying degree of severity. The abdomen is painful on pressure, and there is a drawn, anxious expression of the face, but these symptoms may not make their appearance for from two to six months after the patient has first been exposed to the influence of the poison. Rumination is suspended in cattle. There is obstinate constipation, the passage of fæces being accomplished with difficulty and attended with much pain and straining, the excrement being hard and black. Urine is passed with difficulty in small quantities and at long intervals. There is great emaciation, the eyes are sunk deep into the sockets, and the animal presents the unmistakeable appearance of "plumbism." Death may not take place for from three months to a year, and towards the end delirium, convulsions, coma, and paralysis set in.

Ellenberger and Hofmeister have produced chronic plumbism in the sheep by gradually increasing doses of acetate of lead for from three to four months, giving altogether 150 grammes. There were loss of appetite, disturbance of rumination, constipation, followed by diarrhœa, dulness, great muscular weakness, without paralysis, and suppression of urine, which is loaded with albumen, but poor in carbonates and hippuric acid. There was no appearance of any nervous symptoms. In the Hartz mountains chronic poisoning has been seen in both sheep and goats, giving rise to abortion and sterility.

According to some observers, the dog resists the effects of lead, but others report him to be sensitive to it. Orfila has caused fatal gastro-enteritis and collapse by large doses of acetate of lead, and in smaller quantities chronic poisoning, identical to that observed in the human being. Laho and Mosselman have noted epileptic convulsions.

Combunale and Francois gave 5 centigrammes of chloride of lead daily for a month to dogs. The animals became timid, running away and hiding themselves, as if they suffered from hallucinations, barking in a characteristic manner at imaginary objects and suffering from epileptic fits, which could be induced by any slight excitement, such as the administration of a dose of alcohol, threatened chastisement, or passing a catheter. In some there was chorea of the muscles of one side of the face.

The cat presents the same symptoms, but the convulsive fits are sooner seen.

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Birds of all species appear to be peculiarly sensible to the action of lead.

Post mortem.—Acute. The lesions chiefly consist of a variable degree of gastric enteritis in patches, due to the irritation caused by the poison. In ruminants vesicles are seen in the abomasum and small intestines running on into ulceration; and if the case has existed any length of time, eschars where they have healed up. The surrounding membrane is of a dull grey colour, due to the absorption of lead salts. The brain is congested, the meninges œdematous, with in some cases fluid in the ventricles, the spinal cord being in the same condition. The mucous membranes of the larynx and pharynx are also congested and covered with petechiæ. The lungs and trachea are inflamed and engorged, the bronchii filled with a quantity of bloody froth. In a case reported by Finlay Dun (*Veterinary Medicine*) the cæcum was gangrenous.

Chronic.—The peculiar changes are fatty degeneration of the cell elements of the tissues that the lead comes in contact with, with in many instances sclerosis. The red blood corpuscles are diminished in number, and either broken down or indented along the margin. There is an increase in the number of white corpuscles and quantity of fibrine. In some instances there is granular fatty degeneration of the intestinal glands and fibres of the muscular coat, and some authors have noticed thickening of the areolar connective tissue. The liver undergoes fatty degeneration and sometimes sclerosis sets in.

There is nephritis, which if at all advanced gives rise to calcareous accumulations in Henle's tubes, and the coticular portions of the kidney show traces of sclerosis and atrophy. In the sheep Ellenberger found tumefaction and degeneration of the cell elements, especially in the epithelium composing Bellini's tubes.

In some cases there is fatty degeneration of the heart. The brain is anæmic, yellow, and harder than natural, but there is no appreciable change seen on microscopical examination. The spinal cord shows the usual lesions of myelitis, and the peripheric nerves those of neuritis. In some cases the myelitis is absent and the ganglia enlarged, a condition generally noticed in the laryngeal nerves. The abdominal ganglia of the pneumo-gastric nerve are often enlarged, indurated, and anæmic.

The bones are not likely to undergo any alteration, but cases have been reported of caries. The muscles undergo granular fatty degeneration, and take on a brown tint, giving them the appearance of sun-dried meat.

A blue line round the gums at the junction with the teeth is looked upon as diagnostic of chronic lead poisoning. Taylor points out that this is also seen in mercurial poisoning in some instances, and that in the human being well-marked cases of undoubted lead poisoning have come under his notice with absence of the blue line. Finlay Dun mentions a case of plumbism in cattle in which

the blue line was dissected out, and under the blow-pipe with carbonate of soda a white bead of lead was obtained.

Prognosis.—Except in the earlier stages of the subacute form the prognosis is bad, and where convulsions and brain symptoms set in the result is always fatal.

Treatment.—Treatment is preventive and curative. The first consists of either removing the animals to a healthy locality or stopping the contaminated food or water. Curative measures are directed to elimination by means of emetics of the unabsorbed portion of the poison in the stomach, if the patient can vomit, rendering it insoluble; and elimination of this compound. Treatment of the attacks of colic and treatment of the secondary symptoms. Apomorphine injected subcutaneously is recommended as an emetic for the dog and cat, $\frac{1}{8}$ to $\frac{1}{20}$ of a grain being given in a hypodermic injection; but emetics should only be used in the earlier stages of the case, and are contra-indicated later on, especially when cerebral symptoms are manifested.

The poison is rendered insoluble by milk, albumen, and white of egg, with sulphate of soda or magnesia, which form an insoluble sulphate of lead and at the same time relieve the constipation. Dr. J. Peyron highly recommends sodium sulphide, and Bouchardat sulphide of iron.

Lutz (*Journal de Pharmacie et Chimie*) in chronic plumbism in the human being recommends flowers of sulphur, 50 grammes, divided in three doses the first day, gradually reducing the quantity, the course lasting nine days. The sulphur has a purgative action, and forms sulphide of lead.

Christison suggests the phosphate of soda, which forms phosphate of lead, but this compound is not completely insoluble. Melsens has had great success with iodide of potassium, which combines with the lead and forms a salt that is rapidly eliminated in the bile and urine. This should only be used for six or seven days with an interval of a fortnight. M. Combemale advocates a large dose of olive oil, followed up by daily ones of a fourth the quantity, claiming for it a deobstruent and sedative action. He combines with it menthol or cocaine to reduce the reflex action of the stomach and render it tolerant.

The paroxysms of colic can be obviated with morphia or chloral and the general anæmic state by vegetable tonics and iron. In cases of paralysis strychine and electricity may be had recourse to, but usually treatment is of but little use.

Legal Notes.

By Guy H. Guillum Scott, Barrister-at-Law.

IN THE HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

(Before Mr. Justice Grantham and a Special Jury.)

HIBBERT *v.* ELLAM.

This was an action for the loss of a mare through the alleged negligence of the defendant's servants at the Warren House Stud Farm, Epsom.

Mr. Witt, K.C., and Mr. W. H. Stevenson were for the plaintiff; Mr. Clavell Salter, K.C., and Mr Charles Mathews for the defendant.

Plaintiff's case was that he bought the mare at auction as a two-year-old in July 1902 for 410 guineas, after she had won a race at Newmarket. In the following year she was in training with Mr. W. Nightingall at Epsom, and on June 5 she was sent to the defendant's stud farm to the stallion Tom Cringle, seven years old, by Donovan, out of Seabreeze. Hobbles were put on her, but she began to jump about, and the defendant's stud groom let her go. Hobbled as she was, she cantered round the paddock, and having knocked down the gatepost, she ran on the Downs. After running for a couple of miles she was stopped, but she was so injured, having cut her leg to ribbons with the hobbles, that she had to be killed.

Mr. Nightingall, cross-examined, said that the mare was bought from Lord Cadogan out of a selling race which was worth £200, and she was to be sold for £100. After that she ran in the Corporation Plate, Manchester, at the Warwick November Meeting, and at the November Manchester Meeting, the plates being of the value of £103, the mare being entered to be sold for £50, and she was unplaced and unclaimed. In 1903 she ran three times, but was unplaced.

Re-examined.—Horses of great value were often entered to be sold for £50 or £100, the owners backing them for considerable sums.

Mr. Justice Grantham.—Are you suggesting that the value of a horse is to be dependent on its value as a means of gambling?

Mr. Witt.—I thought every one who knew the turf knew that.

Mr. Justice Grantham.—If you back it in such a way that if it loses the horse is more valuable.—(Laughter.)

Mr. Witt.—Oh, no, no; I thought your Lordship understood these things.—(Laughter.) (To witness.)—Have you known a horse worth £500 put in a selling race, the winner to be sold for £100? It's done almost daily.

The gentleman to whom it belongs puts some money on?—Certainly; puts a lot on.

Mr. John Coleman, the veterinary surgeon who treated the mare after the accident, expressed his opinion that if a man had held her she could not have got away, and if she had been properly hobbled she could not have gone a couple of miles.

Other evidence was called to show that the animal was very quiet, and was worth about £300, being of Hermit blood.

For the defence it was contended that there was no negligence on the part of any of Mr. Ellam's servants, but the accident was due to an out-

break on the part of the mare which could not be avoided. It was a pure misfortune. As a matter of fact she was valueless for racing and of little good for breeding purposes.

Mr. ARCHIBALD M'CALLUM, stud groom of the defendant, described how the mare, who was held by lads in the employ of the plaintiff and defendant, broke away. Witness got hold of the rein, and tried to stop her, but after struggling with her for ten minutes she knocked him on the fence, which she tried to jump, and shook herself free. She tried to jump the gate and broke the post, and got to the Downs.

Cross-examined.—He put a twitch on the mare's upper lip for ten minutes or a quarter of an hour. The twitch was to give a man power over her if she tried to break away.

Mr. WITT.—Did you ever have one on your own nose or lip?—(Laughter.) —No.

Then just you try it, and perhaps you won't be so handy with it next time.—(Laughter.) Do you think it had anything to do with the mare upsetting herself? Not at all.

Did you say that the mare was a mad mare?—I said after she broke away—that she seemed to have gone mad.

After retiring for half an hour the jury found for the plaintiff, damages £25.

Review.

THE CONVOLUTIONS OF THE BRAIN OF THE DOMESTIC ANIMALS COMPARED WITH THAT OF MAN. MM. LESBRE and FORGEOT. Published by A. REY ET CO., Lyons. 1904.

The book is divided into parts :—1. General description of the cerebral convolutions. 2. History of the Study. 3. Principals of nomenclature. 4. The surface of the brain of different domestic animals. 5. The difference of the convolutions and grooves. 6. A comparison of the brain of man with those of the domestic animals. It is impossible to describe in detail the facts discussed, but they are clearly described and reasoned out in a masterly manner from personal observation. There are seventeen figures in the text, clearly and well drawn by M. Forgeot.

Communications, Books, Journals, &c., Received.

Agricultural Journal (Cape of Good Hope); Berliner Thierärztliche Wochenschrift; La Clinica Veterinaria (Milan); Deutsche Thierärztliche Wochenschrift; Tannoform in Veterinary Medicine (March); The Sanitary Journal; Scottish Medical and Surgical Journal; Veterinary Record; La Riforma Veterinaria; Le Mois Scientifique (Paris); L'Echo Vétérinaire (Liège); Annales de Médecine Vétérinaire (Brussels); Johns Hopkins Hospital Reports; Journal of Comparative Medicine and Veterinary Archives; Recueil de Médecine Vétérinaire; Gazette Médicale de Paris; Modern Medicine; Johns Hopkins Hospital Bulletin; Il Veterinario di Campagna (Moncalleri); Le Bulletin Vétérinaire (Orleans); Revista de Medicina Veterinaria (Bucarist); La Revista Veterinaria (Buenos Aires); Zeitschrift für Fleisch und Milchhygiene (Berlin); Buletinul Societatii de Sciinte diu Bucuresci-Romania; The Meat Trades Journal; The Dental Record.

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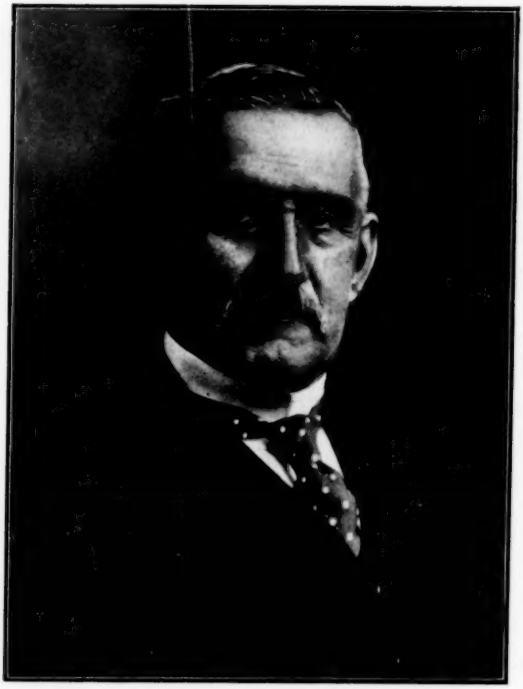

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